

# Olin Wilmington Technical Series

XXXIX. Results of the 2005 Annual Induction Logging  
And Multilevel Piezometer Sampling Events:  
51 Eames Street Site, Wilmington, MA  
(RTN 3-0471)



Prepared for:

Olin Corporation  
Wilmington, MA Facility

October 5, 2005



**Results of the 2005 Annual Induction Logging  
And Multilevel Piezometer Sampling Events:  
51 Eames Street Site, Wilmington, MA  
(RTN 3-0471)**

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# Executive Summary

## Executive Summary

The 51 Eames Street property in Wilmington, Massachusetts (the Property) is a former chemical manufacturing facility that has been owned and operated by various companies since the early 1950s. Historical releases at the Property have caused it, and portions of the surrounding area affected by those releases (the Site), to be listed by the Massachusetts Department of Environmental Protection as a Tier 1A Disposal Site. Olin Corporation (Olin), the current owner of the Property, is responsible for response actions at the Site under the provisions of the Massachusetts Contingency Plan.

This report summarizes the 2005 annual induction-logging and biennial multilevel piezometer sampling events, which are part of the ongoing, comprehensive groundwater-monitoring program that Olin conducts for the Site. The primary aim of the induction-logging/multilevel piezometer sampling is to track the extent and thickness of the dense aqueous-phase liquid (DAPL) that resides on and near the Property, and to monitor other areas within the Western Bedrock Valley for any changes in the distribution of Site-related constituents that may not be apparent from routine water-quality sampling and chemical analyses.

Induction logging has been performed 10 times in selected monitoring wells at the Site. Data from older logging events are discussed in previous Phase II documents. In this report, new induction-logging data for each well logged in 2005 are presented together with the previously collected data to facilitate the detection of temporal changes.

The Site multilevel piezometers were monitored concurrently with the 2005 induction-logging field work. Field parameters were measured on all ports of the four multilevel piezometers at the Site and laboratory analyses were conducted on selected ports during the May 2005 sampling event. The results of those measurements are reported herein. The multilevel piezometer data are used to corroborate the interpretations of inductance logs from nearby wells, as well as to monitor the vertical distribution of Site-related constituents in the on- and near-Property DAPL pools.



Induction-logging results in this report are presented according to general location within the Site: 1) On-Property Containment Area, 2) Off-Property DAPL Area (Upper and Lower DAPL pools), and 3) Western Bedrock Valley. A total of 14 wells were logged within these areas in 2005.

Comparison of the previous and most recent induction-logging and multilevel piezometer sampling results lead to the following conclusions:

- *On-Property Containment Area* – No substantial changes were observed between 2004 and 2005 in the diffuse-zone thickness or top-of-DAPL elevation within the containment structure. The top of the diffuse zone within the containment structure remains approximately 15 to 20 feet below the bottom of the equalization window. Field measurements and analytical results for MP-1 in 2005 were also generally consistent with prior observations at that location.
- *Off-Property DAPL Area* – Variability in the induction-log profile of monitoring well GW-42D and in the solute concentrations observed in MP-2 persisted in 2005. Meanwhile, induction logs for the other wells in the Upper and Lower DAPL pools and data from MP-3 and MP-4 were generally consistent with those of previous years. Thus, while most of the Off-Property DAPL Area is exhibiting quasi-static conditions, the DAPL and diffuse zone in the vicinity of GW-42D in the Upper DAPL Pool continue to show signs of some perturbation and/or fluctuating hydraulic stress.
- *Western Bedrock Valley* – The induction logs from wells GW-87D, GW-64D, and GW-103BR show relatively minor changes in shallow conductivities. These changes may be related to the cessation of pumping in the Town of Wilmington supply wells. Two wells (GW-83D and GW-84D/M) in the Western Bedrock Valley were not logged in 2005 due to repeated instrument failure at the end of the field program.

Results of field parameter measurements and laboratory analysis of the multilevel piezometers in 2005 support the general stability of the DAPL plume indicated by induction logging. The one case where induction logging suggests fluctuations in the DAPL/diffuse boundary (i.e., GW-42D) is also supported by the most recent data at MP-2.

Current estimates of the top-of-DAPL elevations are essentially unchanged from the last assessment, with the exception of the noted fluctuation at the location of GW-42D/MP-2.



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## 1 Introduction

The 51 Eames Street property in Wilmington, Massachusetts (the Property) is a former chemical manufacturing facility that has been owned and operated by various companies since the early 1950s. Historical releases at the Property have caused it, and portions of the surrounding area affected by those releases (the Site), to be listed by the Massachusetts Department of Environmental Protection (MADEP) as a Tier 1A Disposal Site (Release Tracking No. 3-0471). Olin Corporation (Olin), the current owner of the Property, is responsible for response actions at the Site under the provisions of the Massachusetts Contingency Plan, 310 CMR 40.0000.

As a result of historical waste disposal practices, a dense aqueous-phase liquid (DAPL) plume has formed and has migrated approximately 2000 feet from the Property along the top-of-bedrock toward the Western Bedrock Valley (WBV) and Maple Meadow Brook Aquifer (Smith 1997). The DAPL has a total dissolved solids concentration  $>100,000$  mg/L due to high concentrations of aluminum, ammonia, chloride, chromium, iron, sodium, and sulfate. It is further characterized by a low pH ( $<4$ ), a high specific conductivity ( $>20,600$   $\mu\text{mhos/cm}$ ), and a specific gravity of at least  $1.025$  g/cm<sup>3</sup> (Geomega 1999a).

This report summarizes the 2005 annual induction-logging and biennial multilevel piezometer sampling events, which are part of the ongoing, comprehensive groundwater monitoring program that Olin conducts for the Site. The primary aim of the induction-logging/multilevel piezometer sampling program is to track the extent and thickness of the DAPL that resides on and near the Property, and to monitor other areas within the Western Bedrock Valley for any changes in the distribution of Site-related constituents that may not be apparent from routine water-quality sampling and chemical analyses. The data collected each year are used to identify potential changes in water quality since the previous assessment and to extend the time-series of observations, which provides a reliable, long-term view of DAPL/diffuse conditions across the Site.

## 1.1 Multilevel Piezometer Sampling

The 2005 multilevel piezometer sampling event consisted of field-parameter measurements from all ports that produced sufficient water for the measurements and laboratory analyses from selected ports.<sup>1</sup> The biennial laboratory analyses<sup>2</sup> are used to assess groundwater chemistry within and overlying the DAPL plume. Locations of the four multilevel piezometers are shown on Figure 1. Laboratory analytical reports, data validation memoranda, and chain-of-custody forms are attached as Appendix A.

Multilevel piezometer MP-1 was initially installed to monitor conditions in the on-Property portion of the Upper DAPL Pool (Smith 1997). As a result of containment wall construction during Property remediation in 2000-2001 (GEI 2000, 2001), MP-1 now provides information on the vertical profile of groundwater chemistry within the on-Property containment structure. MP-2 and MP-3 monitor vertical distributions of groundwater chemistry in the Upper and Lower DAPL pools, respectively. MP-4 provides information on the solute flux across the Main Street bedrock saddle (e.g., Geomega 2001).

## 1.2 Induction Logging

Induction logging is performed by lowering a small probe down the casing of monitoring wells. The probe generates an electrical current from a transmitter coil located near the top of the probe, and induces an electric eddy current in the formation adjacent to the wells. The induced current produces a secondary electromagnetic field that is detected by a receiver coil located near the bottom of the probe. The intensity of the secondary field is a function of the electrical conductivity of the formation (in particular, pore fluid conductance) and any artifacts induced by the well casing. Because DAPL comprises high concentrations of dissolved constituents, it is much more conductive than ambient groundwater and produces a strong induction-log response.

The induction log response depends not only on pore fluid conductance, but also on the physical properties of the matrix. Data from multilevel piezometer/induction-logging well

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<sup>1</sup> Data from previous multilevel piezometer sampling events are reported in Smith (1997) and Geomega (1999a, 2002a, 2002b, 2003, 2004).

<sup>2</sup> Analytical analyses are performed on multilevel piezometers only every other year.



pairs demonstrates that, for fluids with similar conductivities, the induction log response can vary substantially at different locations due to lithological effects. For example, the log response corresponding to a groundwater specific conductance of 20,600  $\mu\text{mho}/\text{cm}$  varied from 140 to 570 mS/m during the 1998 multilevel piezometer sampling event, with higher values associated with higher permeability lithologies (Geomega 1999b). Hence, the top-of-DAPL interpretation of the induction log data must consider the local lithology.

To account for lithologic effects, the well construction logs were previously reviewed for descriptions of the subsurface materials encountered during drilling (Geomega 2002a). The descriptions were interpreted to provide a gross discrimination between lower and higher permeability zones. For example, the description of a lithology as “hard sand” was interpreted as having a lower permeability than a material described as “gravels and cobbles.” Glacial till, encountered in some wells, was assumed to have a lower permeability than the overlying sand and gravel materials.

Downhole induction logging has been performed 10 times in selected monitoring wells at the Site (Table 1 and Figure 1). For each well logged in 2005, both historical and recent logging data are presented together to facilitate the detection of potential changes over time.<sup>3</sup>

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<sup>3</sup> Data from previous logging events are reported and discussed in Smith (1997) and Geomega (1998, 1999b, 2000, 2002a, 2002b, 2003, 2004).

## 2 Multilevel Piezometer Sampling

Field parameters were measured in May 2005 at all productive ports of MP-1, MP-2, MP-3, and MP-4, and selected ports of those multilevel piezometers were sampled for laboratory analyses.

### 2.1 Sampling Protocol

Samples were obtained from the multilevel piezometers by connecting a peristaltic pump to the tubing from each labeled sampling port. The groundwater from each port was pumped to a flow-through cell until the field parameters (pH, specific conductance, temperature, Eh, dissolved oxygen) stabilized. The values were then recorded in the field notebook (Table 2). Analytical samples were collected for laboratory analysis in laboratory-supplied containers with appropriate preservatives, refrigerated or stored on ice in coolers, and submitted to the laboratory under appropriate chain of custody. Appendix A contains the laboratory results and data validation memoranda for all analytical data collected during the sampling event.

### 2.2 2005 Results

Results of the 2005 field measurements from the multilevel piezometers are consistent with previous years' data, generally showing an increase in concentration with depth into the diffuse and DAPL zones. Using a specific conductance (SC) criterion of 20,600  $\mu\text{mhos/cm}$  as an indicator of the DAPL limit,<sup>4</sup> DAPL was first detected in Port #3 at MP-1 (Table 2a), in Port #4 at MP-2 (Table 2b), and in Port #4 at MP-3 (Table 2c); it was also present in all lower ports at those locations. DAPL was detected at MP-4 in one deep port (#5), which is connected to a localized bedrock fracture zone (Table 2d). The measured SC at all other MP-4 ports (including some that are connected to other bedrock fracture zones) indicated sub-DAPL conditions at those locations.

The current SC measurements from 2005 were compared to those made in 2003 and 2004 to assess potential changes in the DAPL/diffuse boundary over the past two years.

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<sup>4</sup> Geomega (1999a) distinguished between DAPL and diffuse waters primarily on the basis of specific gravity, but it was also shown that there is a strong correlation ( $r = 0.94$ ) between specific gravity and specific conductance in Site groundwater. Using that correlation, a specific gravity of 1.025 (the lower bound for DAPL) corresponds to a specific conductance value of 20,600  $\mu\text{mhos/cm}$ .

At MP-1, very little change in SC was observed between 2003, 2004, and 2005 (Figure 2). Meanwhile, a substantial change was observed in 2004 at MP-2 between the depths of 17 and 27 feet below ground surface (ft bgs), but the 2005 data were consistent in this interval with the 2003 data (Figure 3). The 2003 through 2005 SC measurements at MP-3 were similar each year, although in 2005 slightly higher SC values were measured between 45 and 51 ft bgs, as well as in the two deepest ports (Figure 4). At MP-4, the highest SC value occurred at a depth of 110 ft bgs in a bedrock fracture zone in both 2004 and 2005 (Figure 5). Interestingly, the deepest two or three ports in each of the multilevel piezometers show slightly increasing SC values from 2003 through 2005.

In general, the laboratory results for the multilevel piezometer ports sampled in 2005 (Table 3) were also consistent with data collected in 2003 (cf. Geomega 2003, Table 3). The only notable exceptions were increases in 2005 in chloride and sulfate concentrations in MP-3 Port #4, and in ammonia concentrations in the deepest ports of MP-1, MP-2, and MP-3. Table 4 lists historical multilevel piezometer data for key Site parameters and shows the vertical distribution of DAPL and diffuse zones at the time of each sampling event.

### 3 Induction Logging

For discussion purposes, the induction-logging results are considered on the basis of general location within the Site: 1) the On-Property Containment Area, 2) the Off-Property DAPL Area (Upper and Lower DAPL pools), and 3) the Western Bedrock Valley. A total of 14 wells were logged within these areas in 2005 (Table 1). Changes in the number of logged wells have occurred over the period of historical record because some of the original wells were destroyed by construction activities during the 2000-2001 Property remediation/redevelopment, while others have become unusable for the purpose of induction logging for other reasons. Additionally, some of the wells logged in 2000 were supplemental to the annual program.

Extra care has been taken since 2001 to accurately record the initial depths of the logs for each well. Because this was not a routine practice in the earlier monitoring events, it was necessary to modify the depth data from those events to align the earlier logs with the more recent ones (Geomega 2000a). The correction allows direct comparison of all the logs, thereby facilitating the identification of temporal trends.

#### 3.1 On-Property Containment Area

Monitoring well GW-35D is the only remaining on-Property monitoring well in the induction-logging program because the other on-Property wells (GW-22D, GW-27D, GW-36, and GW-38D) were destroyed during Property remediation/redevelopment activities. GW-35D is located within the containment structure (slurry wall), hence providing data on the response of DAPL to containment.

The data from GW-35D show a consistent decay in the peak conductance at depth from 1997 through 2000, little change in the peak conductance between 2000 and 2003, and then further declines in 2004 and 2005 (Figure 6). Also, the 2001 to 2003 logs show a slight increase in conductance at shallower depths (i.e., approximately 25 to 33 ft bgs in the diffuse zone), which appears to have stabilized in 2004 and 2005. The region of increased diffuse-zone conductance remains approximately 20 feet below the level of the equalization window.

### 3.2 Off-Property DAPL Area

The off-Property DAPL is naturally divided into two pools that are separated by an intervening bedrock saddle (Figure 1). The Upper DAPL Pool is monitored by wells GW-42D and GW-43D, and GW-69D,<sup>5</sup> where the top-of-DAPL elevation has typically been measured at ~60 feet MSL<sup>6</sup> and the deepest part of the bedrock is at ~40 feet MSL. The Lower DAPL Pool is monitored by wells GW-44D, GW-45D, GW-59D, and GW-70D, where the top-of-DAPL elevation has consistently been ~40 feet MSL and the deepest area of the bedrock is ~20 feet MSL. Hence, the maximum thickness of DAPL in both pools is about 20 feet.

#### 3.2.1 Upper DAPL Pool

Variability in the induction-log profile of monitoring well GW-42D persisted in 2005, particularly in the diffuse zone at depths between ~17 to 23 ft bgs (Figure 7). In 2005, the conductivities observed in this depth range were among the lowest recorded. The peak historical conductances measured in this depth range are comparable to the values observed in the deeper DAPL. This result has been attributed to the higher permeability of the medium-grained sand at shallower depths in that area, which produces a stronger log response than the lower permeability material at depth, when the fluctuating DAPL/diffuse interface moves diffuse-zone solutes into the higher permeability sand layer (Geomega 1999b).

The observed variability in the induction-log profile at GW-42D, which is corroborated by data from MP-2 (Section 2.2), is indicative of some perturbation and/or fluctuating hydraulic stress to that specific area. Previously suggested possible causes for the perturbation (Geomega 2000, 2002a, 2002b) include:

1. variations in pumping at the Sanmina supply wells,

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<sup>5</sup> Although not located in the DAPL, well GW-69D is included in this discussion because of its close proximity to the Off-Property DAPL Area.

<sup>6</sup> All elevations are referenced to mean sea level (MSL), National Geodetic Vertical Datum of 1929.

2. seasonal changes in the groundwater flow regime as the groundwater divide between the Aberjona and Ipswich watersheds fluctuates across the location of GW-42D/MP-2 (Figure 1), and
3. temporary disruption of the local groundwater system as a result of nearby Property remediation activities and installation of the containment wall in 2000-2001.

It is currently unclear which, if any, of these possibilities is contributing to the fluctuating DAPL/diffuse interface in the vicinity of GW-42D/MP-2, or whether there is some other explanation for the observed behavior at that particular location. In any case, the magnitude of the perturbation(s) appears to be remaining stationary and only affecting conditions locally at GW-42D/MP-2.

Prior to 2003, induction-logging results from GW-43D (also in the Upper DAPL Pool) showed a consistent decline in conductance over time (Figure 8). Data from the 2003 log, however, showed a slight increase in conductance, approaching the level observed in 2000. In 2004, the peak conductivity was low, but that result was thought to be unreliable because of an instrument calibration error. However, the data from 2005 are very similar to those from 2004, and no calibration issue was noticed in the 2005 measurements.

The induction logs from GW-69D (Figure 9), located in the diffuse zone adjacent to the Upper DAPL Pool, have been relatively stable in the deepest, highest conductivity zone (40 to 45 ft bgs). However, the shallower, lower conductivity transition zone (30 to 40 ft bgs) has shown a consistent decline in induction-log conductance through 2002, with a slight perturbation in the diffuse zone observed in 2003. The 2004 log was similar to the earlier logs, and the 2005 log shows a continuing decrease in diffuse-zone thickness at this location.

### 3.2.2 Lower DAPL Pool

Induction logs for wells GW-44D (Figure 10) and GW-45D (Figure 11) were generally consistent with those of previous years. Similarly, induction logs from GW-59D

(Figure 12) and GW-70D (Figure 13), located near the Main Street bedrock saddle, continue to remain stable.

### 3.3 Western Bedrock Valley

Two diffuse-zone wells immediately downgradient of the Main Street bedrock saddle, GW-58D (Figure 14) and GW-62BR (Figure 15), remain stable at depth. However, in GW-62BR the conductance above bedrock declined in 2005 relative to previous data.

Despite several attempts, wells GW-83D and GW-84D/M<sup>7</sup> were not logged in 2005 due to repeated instrument failure; however, logs from these wells in previous years were relatively stable over their six- to eight-year periods of record. The 2005 log from well GW-85D (Figure 16) is consistent with previous logs, indicating that conditions have remained stable at that location. The 2005 log response from GW-87D is consistent with previous logs at depth, but the new data indicate decreasing conductivity at depths  $\leq 80$  ft bgs (Figure 17). Likewise, the 2005 data from GW-64D (Figure 18) indicate decreasing conductivity in the shallow zone. The log from GW-103BR (Figure 19) shows a slight increase in conductivity in the shallowest zone ( $\leq 20$  ft bgs), but is otherwise consistent with previous logs at depth. These relatively minor changes at shallow elevations in wells in close proximity to Town of Wilmington supply wells may be related to the cessation of pumping of those supply wells.

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<sup>7</sup> Well GW-84D has not been logged since 2000 due to an obstruction that prevents the logging tool from being lowered more than five feet into the casing, so it has been replaced in the induction-logging network by GW-84M (the next deepest well in that cluster). Although too shallow to monitor conditions at the base of the aquifer, well GW-84M still provides useful information with regard to potential changes in shallow groundwater quality, which could ultimately affect surface water conditions in Maple Meadow Brook.

## 4 Top-of-DAPL Elevations

Top-of-DAPL elevations at the multilevel piezometers were identified as the midpoints between adjacent ports spanning the DAPL/sub-DAPL transition.<sup>8</sup> Top-of-DAPL elevations on the inductance logs were picked using the depths to inflection points on the logs, after accounting for the lithology at each location.<sup>9</sup>

The estimated top-of-DAPL elevations in 2005 from both multilevel piezometers and induction logs are shown on Figure 1, together with an interpretation of the current lateral extent of DAPL. With the exception of continuing fluctuations in the top-of-DAPL elevation at GW-42D/MP-2, the DAPL/diffuse interface in both the Upper and Lower DAPL pools appears to have remained stable over the past year.

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<sup>8</sup>Transition based upon an SC criterion of 20,600  $\mu\text{mhos/cm}$ , as discussed in Section 2.2.

<sup>9</sup> Lithological effects were discussed in Section 1.2.



## 5 Conclusions

Comparison of the previous and most recent induction-logging and multilevel piezometer sampling results lead to the following conclusions:

- *On-Property Containment Area* – No substantial changes were observed between 2004 and 2005 in the diffuse-zone thickness or top-of-DAPL elevation within the containment structure. The top of the diffuse zone within the containment structure remains approximately 15 to 20 feet below the bottom of the equalization window. Field measurements and analytical results for MP-1 in 2005 were also generally consistent with prior observations at that location.
- *Off-Property DAPL Area* – Variability in the induction-log profile of monitoring well GW-42D and in the solute concentrations observed in MP-2 persisted in 2005. Meanwhile, induction logs for the other wells in the Upper and Lower DAPL pools and data from MP-3 and MP-4 were generally consistent with those of previous years. Thus, while most of the Off-Property DAPL Area is exhibiting quasi-static conditions, the DAPL and diffuse zone in the vicinity of GW-42D in the Upper DAPL Pool continue to show signs of some perturbation and/or fluctuating hydraulic stress.
- *Western Bedrock Valley* – The induction logs from wells GW-87D, GW-64D, and GW-103BR show relatively minor changes in shallow conductivities. These changes may be related to the cessation of pumping in the Town of Wilmington supply wells. Two wells (GW-83D and GW-84D/M) in the Western Bedrock Valley were not logged in 2005 due to repeated instrument failure at the end of the field program.

Results of field parameter measurements and laboratory analysis of the multilevel piezometers in 2005 support the general stability of the DAPL plume indicated by induction logging. The one case where induction logging suggests fluctuations in the DAPL/diffuse boundary (i.e., GW-42D) is also supported by the most recent data at MP-2.

Current estimates of the top-of-DAPL elevations are essentially unchanged from the last assessment, with the exception of the noted fluctuation at GW-42D/MP-2.

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# Tables

Table 1. Induction logging years and wells.

Well	1992	1997	1998	1999	2000	2001	2002	2003	2004	2005
GW-22D		X	X							
GW-27D		X	X	X	X					
GW-29D				X	X					
GW-30DR		X	X							
GW-34D		X	X							
GW-35D		X	X	X	X	X	X	X	X	X
GW-36D	X	X	X	X	X					
GW-37D		X	X							
GW-38D		X	X	X	X					
GW-42D	X	X	X	X	X	X	X	X	X	X
GW-43D	X	X	X	X	X	X	X	X	X	X
GW-44D	X	X	X	X	X	X	X	X	X	X
GW-45D	X	X	X	X	X	X	X	X	X	X
GW-50D		X	X							
GW-55D		X	X							
GW-58D	X	X	X	X	X	X	X	X	X	X
GW-59D	X	X	X	X	X	X	X	X	X	X
GW-61BR	X									
GW-62BR				X	X	X	X	X	X	X
GW-62D	X		X							
GW-64D				X	X	X	X	X	X	X
GW-67D			X		X					
GW-68BR	X									
GW-69D	X	X	X	X	X	X	X	X	X	X
GW-70D	X	X	X	X	X	X	X	X	X	X
GW-71D	X									
GW-82D		X	X							
GW-83D		X	X	X	X	X	X	X	X	
GW-84M/D		X	X	X	X	X			X	
GW-85D		X	X	X	X	X		X	X	X
GW-86D		X								
GW-87D		X		X	X			X	X	X
GW-103BR				X	X	X	X	X	X	X
GW-103D				X	X					

Table 2a. Multilevel piezometer field data (MP-1), May 2005.

MP-1 Port	Depth (feet bgs)	Elevation (feet MSL)	Temp (°C)	Specific Conductance (μS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Eh (mV)
18	5	79.9	12.35	2342	0.60	6.97	151.6
17	7.5	77.4	11.90	2393	0.53	7.14	131.8
16	10	74.9	11.88	2333	0.48	6.66	-88.4
14	14	70.9	11.87	869	0.36	7.12	-50.9
13	15.5	69.4	12.00	846	0.41	7.08	-17.6
12	17	67.9	12.71	894	0.49	7.03	-67.1
11	18.5	66.4	12.21	914	0.43	6.98	-83.6
10	20	64.9	12.36	921	0.40	6.92	-92.5
8	23	61.9	12.77	1047	0.41	6.65	18.2
7	24.5	60.4	13.53	2251	0.37	6.16	-83.2
6	26	58.9	13.50	6392	0.36	5.50	-0.1
5	27.5	57.4	12.72	7554	0.43	4.61	115.2
4	30	54.9	12.57	13257	0.38	3.65	248.8
3	32.5	52.4	12.49	49059	0.44	3.56	203.5
2	35	49.9	12.54	70978	0.37	3.64	154.2
1	37.5	47.4	12.53	82042	0.41	3.65	177.2

## Notes:

bgs = below ground surface

MSL = referenced to mean sea level, National Geodetic Vertical Datum of 1929

Eh = Oxidation-Reduction Potential (ORP)

Table 2b. Multilevel piezometer field data (MP-2), May 2005.

MP-2 Port	Depth (feet bgs)	Elevation (feet MSL)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Eh (mV)
17	5.5	78.64	10.81	937	0.52	5.93	-11.9
16	8	76.14	11.31	344	0.58	5.55	-15.4
15	10.5	73.64	9.89	340	0.38	5.47	-23.7
14	12	72.14	10.14	341	0.36	5.51	-36.2
13	13.5	70.64	10.52	208	0.39	5.43	-24.2
12	15	69.14	10.89	208	0.42	5.16	12.5
11	17.5	66.64	11.38	178	0.42	4.97	38.7
10	20	64.14	11.45	1732	0.4	5.10	100.2
9	22.5	61.64	11.73	74.33	0.43	4.21	242.6
8	24	60.14	11.56	6454	0.4	4.24	250.5
7	25.5	58.64	11.35	7380	0.27	4.21	254.6
6	27	57.14	11.59	18333	0.35	3.99	257.5
4	30	54.14	11.42	43631	0.28	3.73	239.2
3	32.5	51.64	11.34	65532	0.63	3.60	264.1
2	35	49.14	11.32	78925	0.36	3.44	293.0
1	37.5	46.64	11.34	84925	0.29	3.5	256.1

## Notes:

bgs = below ground surface

MSL = referenced to mean sea level, National Geodetic Vertical Datum of 1929

Eh = Oxidation-Reduction Potential (ORP)

**Table 2c. Multilevel piezometer field data (MP-3), May 2005.**

<b>MP-3 Port</b>	<b>Depth (feet bgs)</b>	<b>Elevation (feet MSL)</b>	<b>Temp (°C)</b>	<b>Specific Conductance (µS/cm)</b>	<b>Dissolved Oxygen (mg/L)</b>	<b>pH (S.U.)</b>	<b>Eh (mV)</b>
21	13.5	77	7.86	85	0.88	5.51	99.5
20	15	75.5	8.37	138	0.68	6.22	77.0
19	16.5	74	9.21	705	0.83	5.42	27.7
18	18	72.5	7.96	275	0.57	5.61	-15.4
17	21.5	69	7.97	258	0.54	5.54	-23.0
16	25	65.5	8.80	645	0.72	5.35	-116.0
15	28.5	62	8.67	656	0.44	5.45	-59.6
13	34.5	56	8.45	664	0.68	5.48	-81.2
11	37.5	53	8.82	656	0.62	5.46	-104.3
9	40.5	50	8.96	687	0.60	5.41	-77.6
8	42	48.5	9.16	817	0.96	5.52	33.9
7	43.5	47	9.19	1075	0.74	5.33	66.0
6	45	45.5	9.25	13798	0.60	4.13	201.8
5	47.5	43	9.94	17518	0.46	3.96	187.2
4	51	39.5	10.66	21555	0.37	3.77	201.2
3	55.5	35	10.75	36504	0.36	3.34	330.0
2	60	30.5	10.55	52287	0.41	3.66	194.6
1	65.5	25	11.09	62537	0.44	3.69	189.9

## Notes:

bgs = below ground surface

MSL = referenced to mean sea level, National Geodetic Vertical Datum of 1929

Eh = Oxidation-Reduction Potential (ORP)



Table 2d. Multilevel piezometer field data (MP-4), May 2005.

MP-4 Port	Depth (feet bgs)	Elevation (feet MSL)	Temp (°C)	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	Eh (mV)
14	24	72	11.56	1830	1.08	5.31	160.6
13	39	57	11.86	1658	0.93	5.67	-29.1
12	50	46	12.45	1310	0.61	5.95	-168.3
11	55	41	12.25	1477	0.63	5.87	-137.3
10	60	36	11.88	14469	0.46	4.19	156.1
5	110	-14	13.65	29874	1.16	4.65	120.0
3	143	-47	12.05	14866	0.51	6.28	-107.9
2	155	-59	11.81	14464	0.46	6.08	-97.3
1	166	-70	12.15	15540	1.04	6.19	-85.5

## Notes:

bgs = below ground surface

MSL = referenced to mean sea level, National Geodetic Vertical Datum of 1929

Eh = Oxidation-Reduction Potential (ORP)

Table 3a. Multilevel piezometer chemistry (MP-1), May 2005.

MP-1 Port	Chromium (mg/l)	Iron (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Nitrate	Nitrite	Ammonia	Aluminum (mg/l)	Calcium (mg/l)	Specific Gravity
							Nitrogen as N (mg/l)	Nitrogen as N (mg/l)	Nitrogen as N (mg/l)			
17	< 0.01	< 0.1	11	100	29	2600	4.8	< 0.5	0.76	< 0.2	610	1.00
8	0.015	< 0.05	4.4	98	58	480	2.9	0.34	46	0.11	140	1.00
7	0.024	< 0.05	16	220	110	380	1.3	< 0.01	160	< 0.1	260	1.00
6	0.037	0.42	74	450	50	550	0.14	< 0.01	520	0.3	410	1.01
5	0.47	1.7	100	560	490	3900	0.21	< 0.01	590	9.3	430	1.01
5 dup	0.5	1.7	100	570	210	300	0.2	< 0.01	560	9.6	440	1.00
4	14	2.6	270	1300	110	790	2	< 0.01	1100	140	450	1.01
1	2100	3300	1700	20000	590	4700	3.1	< 0.5	9700	2100	600	1.11

Table 3b. Multilevel piezometer chemistry (MP-2), May 2005.

MP-2 Port	Chromium (mg/l)	Iron (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Nitrate	Nitrite	Ammonia	Aluminum (mg/l)	Calcium (mg/l)	Specific Gravity
							Nitrogen as N (mg/l)	Nitrogen as N (mg/l)	Nitrogen as N (mg/l)			
15	0.023	2.1	1.2	48	87	22	< 0.05	< 0.01	2.4	0.26	11	1.00
11	0.041	1.2	0.94	19	34	34	< 0.05	< 0.01	1.2	0.14	7.5	1.00
10	0.23	10	6.7	140	260	790	< 0.05	< 0.01	75	0.47	24	1.00
9	7.3	87	49	810	720	3300	< 0.05	< 0.01	4900	34	130	1.01
6	68	320	160	2500	2300	9000	< 0.05	< 0.01	1600	250	320	1.02
4	600	820	610	7700	2700	12000	2	< 0.1	3900	1100	480	1.05
1	3000	2200	1300	21000	4300	20000	4.1	< 0.5	12000	2200	2200	1.11

Table 3c. Multilevel piezometer chemistry (MP-3), May 2005.

MP-3 Port	Chromium (mg/l)	Iron (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Nitrate	Nitrite	Ammonia	Aluminum (mg/l)	Calcium (mg/l)	Specific Gravity
							Nitrogen as N (mg/l)	Nitrogen as N (mg/l)	Nitrogen as N (mg/l)			
19	< 0.005	< 0.05	6.3	100	210	78	2.4	< 0.01	16	< 0.1	33	1.00
13	< 0.005	< 0.05	6.1	100	210	48	0.49	< 0.01	2.6	< 0.1	38	1.00
7	< 0.005	< 0.05	6.7	120	250	210	1.7	< 0.01	50	0.13	32	1.00
5	11	9.8	210	1800	430	1900	5.4	< 0.01	1600	230	290	1.00
4	34	10	320	2600	24000	83000	9.1	< 0.01	180	370	440	1.02
3	220	150	620	5700	540	5600	15	< 0.02	3200	1100	510	1.03
1	960	2200	1000	13000	3200	4500	12	< 0.1	5200	1700	580	1.06

Table 3d. Multilevel piezometer chemistry (MP-4), May 2005.

MP-4 Port	Chromium (mg/l)	Iron (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Chloride (mg/l)	Sulfate (mg/l)	Nitrate	Nitrite	Ammonia	Aluminum (mg/l)	Calcium (mg/l)	Specific Gravity
							Nitrogen as N (mg/l)	Nitrogen as N (mg/l)	Nitrogen as N (mg/l)			
13	< 0.005	8.3	8.2	280	570	44	1.3	0.024	3.5	< 0.1	49	1.00
13 dup	< 0.005	7.1	8.2	290	130	41	1.5	0.016	3.3	< 0.1	48	1.00
10	11	220	160	1600	930	3700	0.12	0.079	9.8	110	370	1.01
5	5.2	2400	610	4600	1300	4100	0.4	< 0.01	15	26	470	1.02
3	16	410	380	1600	720	1200	0.46	< 0.01	6.8	< 0.2	490	1.01
2	16	320	380	1500	1500	2500	0.33	< 0.01	5.1	< 0.2	480	1.00

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**  
DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-1	18	5	79.9	4/17/96	47	5.4	2.6	84	1200		
MP-1	18	5	79.9	5/22/96	21	4	1.5	72	1400	6.64	2,360
MP-1	18	5	79.9	8/10/98	2.08	<5	0.54	64.4	1510	6.41	2,190
MP-1	18	5	79.9	5/13/01						8.44	2550
MP-1	18	5	79.9	4/10/02						6.60	1777
MP-1	18	5	79.9	3/25/03						6.621	2340
MP-1	18	5	79.9	4/19/04						7.490	2910
MP-1	18	5	79.9	5/3/05						6.97	2342
MP-1	17	7.5	77.4	4/17/96	35	1.2	1.3	4.9	1300		
MP-1	17	7.5	77.4	5/22/96	17	4.1	0.98	66	1400	6.53	2,290
MP-1	17	7.5	77.4	5/13/01	34	1	32	130	920	7.52	2510
MP-1	17	7.5	77.4	3/25/03	15.7	5.29	8.61	63.4	1210	6.946	2260
MP-1	17	7.5	77.4	4/19/04						7.488	2740
MP-1	17	7.5	77.4	5/3/05	29	11	0.76	100	2600	7.14	2393
MP-1	16	10	74.9	4/17/96	42	22	8.2	220	1500		
MP-1	16	10	74.9	5/22/96	26	15	6.7	180	1400	6.82	2,690
MP-1	16	10	74.9	8/10/98	2.08	6	1.52	78.2	1410	6.57	2,130
MP-1	16	10	74.9	5/13/01						6.94	1731
MP-1	16	10	74.9	3/25/03						6.75	1732
MP-1	16	10	74.9	4/19/04						7.186	2050
MP-1	16	10	74.9	5/3/05						6.66	2333
MP-1	14	14	70.9	4/18/96	68	16	50	200	820		
MP-1	14	14	70.9	5/22/96	52	13	32	190	590	7.21	1,760
MP-1	14	14	70.9	5/13/01						7.38	665
MP-1	14	14	70.9	3/25/03						7.127	1168
MP-1	14	14	70.9	4/19/04						7.374	1002
MP-1	14	14	70.9	5/3/05						7.12	869

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-1	13	15.5	69.4	4/18/96	32	7.3	43	72	360		
MP-1	13	15.5	69.4	5/22/96	28	6.5	36	68	320	7.63	1,082
MP-1	13	15.5	69.4	8/10/98	7.29	<5	19	21.8	258	7.03	768
MP-1	13	15.5	69.4	5/13/01						7.32	759
MP-1	13	15.5	69.4	3/25/03						7.124	1095
MP-1	13	15.5	69.4	4/19/04						7.390	985
MP-1	13	15.5	69.4	5/3/05						7.08	846
MP-1	12	17	67.9	4/18/96	30	4.9	34	55	180		
MP-1	12	17	67.9	5/22/96	22	3.9	36	46	280	7.62	955
MP-1	12	17	67.9	5/13/01						7.43	822
MP-1	12	17	67.9	3/25/03						6.786	1095
MP-1	12	17	67.9	4/19/04						7.329	990
MP-1	12	17	67.9	5/3/05						7.03	894
MP-1	11	18.5	66.4	4/18/96	25	3.9	31	35	170		
MP-1	11	18.5	66.4	5/22/96	21	3.7	31	34	240	7.58	899
MP-1	11	18.5	66.4	8/10/98	8.33	<5	17.2	17.9	247	6.99	740
MP-1	11	18.5	66.4	5/13/01						7.38	820
MP-1	11	18.5	66.4	3/25/03						6.974	1123
MP-1	11	18.5	66.4	4/19/04						7.248	1001
MP-1	11	18.5	66.4	5/3/05						6.98	914
MP-1	10	20	64.9	4/18/96	27	4.4	33	42	140		
MP-1	10	20	64.9	5/22/96	21	3.6	32	39	240	7.56	910
MP-1	10	20	64.9	8/10/98	7.29	<5	16.3	18.4	196	6.66	765
MP-1	10	20	64.9	5/13/01						7.45	724
MP-1	10	20	64.9	4/10/02						6.94	994
MP-1	10	20	64.9	3/25/03	237	30.5	229	285	2110	6.983	1125
MP-1	10	20	64.9	4/19/04						7.091	1047

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-1	10	20	64.9	5/3/05						6.92	921
MP-1	8	23	61.9	4/18/96	42	4.4	30	49	330		
MP-1	8	23	61.9	5/23/96	28	3.9	29	49	230	7.36	843
MP-1	8	23	61.9	8/10/98	10.4	<5	20.6	22.9	208	6.49	800
MP-1	8	23	61.9	5/13/01	43	2.1	31	52	200	7.09	888
MP-1	8	23	61.9	3/25/03						6.82	1170
MP-1	8	23	61.9	4/19/04						6.963	1071
MP-1	8	23	61.9	5/3/05	58	4.4	46	98	480	6.65	1047
MP-1	7	24.5	60.4	5/23/96	27	3.6	27	33	370	7.25	1,122
MP-1	7	24.5	60.4	8/10/98	8.33	<5	27.4	22.6	517	6.65	1,016
MP-1	7	24.5	60.4	5/13/01	23	2.9	20	32	70	6.73	845
MP-1	7	24.5	60.4	4/10/02						6.62	1133
MP-1	7	24.5	60.4	3/25/03	77.3	4.62	79.8	106	684	6.541	1750
MP-1	7	24.5	60.4	4/19/04						6.705	2050
MP-1	7	24.5	60.4	5/3/05	110	16	160	220	380	6.16	2251
MP-1	6	26	58.9	5/23/96	55	9.6	64	85	720	6.05	1,849
MP-1	6	26	58.9	8/10/98	44.8	8.04	83.6	54	930	5.08	2,045
MP-1	6	26	58.9	5/13/01	37	6.3	2	50	680	5.25	1470
MP-1	6	26	58.9	3/25/03	256	32.5	253	298	1760	5.321	4310
MP-1	6	26	58.9	4/19/04						5.238	7230
MP-1	6	26	58.9	5/3/05	50	74	520	450	550	5.50	6392
MP-1	5	27.5	57.4	4/18/96	900	96	220	830	5300		
MP-1	5	27.5	57.4	5/23/96	8300	150	620	800	4800	3.96	9,900
MP-1	5	27.5	57.4	8/10/98	232	32.1	189	148	2600	4.50	4,135
MP-1	5	27.5	57.4	5/13/01	260	20	7.8	160	2000	4.29	3220
MP-1	5	27.5	57.4	4/10/02						3.47	5830
MP-1	5	27.5	57.4	3/25/03	564	77.2	577	624	3510	3.966	8120



**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-1	5	27.5	57.4	4/19/04						4.481	9060
MP-1	5	27.5	57.4	5/3/05	490	100	590	560	3900	4.61	7554
MP-1	5 (dup)	27.5	57.4	5/3/05	210	100	560	570	300	4.61	7554
MP-1	4	30	54.9	4/18/96	6400	900	6.3	9300	42000		
MP-1	4	30	54.9	5/23/96	3900	1100	850	8900	31000	3.46	45,300
MP-1	4	30	54.9	8/11/98	3100	610	1830	3400	20000	3.43	21,750
MP-1	4	30	54.9	5/13/01	2700	400	1440	2300	9800	3.85	18600
MP-1	4	30	54.9	4/10/02						3.17	18290
MP-1	4	30	54.9	3/25/03	2040	324	721	1840	9950	3.657	16570
MP-1	4	30	54.9	4/19/04						3.941	14720
MP-1	4	30	54.9	5/3/05	110	270	1100	1300	790	3.65	13257
MP-1	4	30	54.9	5/3/05						3.65	13257
MP-1	3	32.5	52.4	5/23/96	14000	1200	170	16000	59000	3.68	70,200
MP-1	3 (dup)	32.5	52.4	5/23/96	13000	1200	370	15000	59000	3.68	70200
MP-1	3	32.5	65	8/11/98	11500	1000	5210	12000	32600	3.94	45,050
MP-1	3	32.5	52.4	5/13/01						3.92	50800
MP-1	3	32.5	52.4	3/25/03	7960	1310	6.52	2200	44400	3.69	52500
MP-1	3	32.5	52.4	4/19/04						3.795	48200
MP-1	3	32.5	52.4	5/3/05						3.56	49059
MP-1	2	35	49.9	4/18/96	13000	1200	5.9	19000	64000		
MP-1	2	35	49.9	5/23/96	69000	1400	230	19000	72000	3.65	70,900
MP-1	2	35	49.9	8/11/98	14400	1200	5940	15000	36800	3.79	50,650
MP-1	2	35	49.9	5/13/01						4.01	64200
MP-1	2	35	49.9	4/19/04						3.872	66400
MP-1	2	35	49.9	5/3/05						3.64	70978
MP-1	1	37.5	47.4	4/18/96	17000	1500	7.1	25000	74000		
MP-1	1	37.5	47.4	5/23/96	91000	1800	170	23000	73000	3.76	90,200

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-1	1	37.5	47.4	8/11/98	18300	1600	6830	20000	42700	3.75	53,900
MP-1	1	37.5	47.4	5/13/01	28800	1500	156	24000	89000	4.01	74000
MP-1	1	37.5	47.4	3/25/03	1470	1930	4.54	24600	7490	3.724	69100
MP-1	1	37.5	47.4	4/19/04						3.863	75700
MP-1	1	37.5	47.4	5/3/05	590	1700	9700	20000	4700	3.65	82042
MP-2	17	5.5	78.64	5/20/96	190	7	23	250	390	5.93	1,719
MP-2	17	5.5	78.64	8/11/98	72.3	1.5	8.56	72	38.6	5.52	499
MP-2	17	5.5	78.64	5/14/01						5.813	572
MP-2	17	5.5	78.64	3/27/03	29.1	1.96	2.88	92.1	243	6.441	639
MP-2	17	5.5	78.64	4/20/04						6.269	478
MP-2	17	5.5	78.64	5/2/05						5.93	937
MP-2	16	8	76.14	5/20/96	150	4.7	28	220	430	5.86	1,309
MP-2	16	8	76.14	5/14/01						5.65	453
MP-2	16	8	76.14	3/27/03	42.4	1.7	2.12	59.7	17.8	6.103	275
MP-2	16	8	76.14	4/20/04						5.910	329
MP-2	16	8	76.14	5/2/05						5.55	344
MP-2	15	10.5	73.64	5/20/96	140	5.5	20	270	570	5.43	1,730
MP-2	15	10.5	73.64	8/11/98	93.6	1.2	6.38	50	36.6	5	435
MP-2	15	10.5	73.64	5/14/01	93	2.2	3.8	66	42	5.24	449
MP-2	15 (dup)	10.5	73.64	5/14/01	98	2.3	4	66	43	5.24	449
MP-2	15	10.5	73.64	3/27/03	42.4	0.931	1.46	46.7	303	5.775	433
MP-2	15	10.5	73.64	4/20/04						5.860	344
MP-2	15	10.5	73.64	5/2/05	87	1.2	2.4	48	22	5.47	340
MP-2	14	12	72.14	5/20/96	100	2.9	15	130	200	5.297	737
MP-2	14	12	72.14	5/14/01						5.55	397
MP-2	14	12	72.14	3/27/03	84.4	1.92	2.21	55.1	38	5.774	457
MP-2	14	12	72.14	4/20/04						5.849	407

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-2	14	12	72.14	5/2/05						5.51	341
MP-2	13	13.5	70.64	5/20/96	75	2.9	9.7	89	160	5.11	699
MP-2	13	13.5	70.64	8/11/98	76.3	1.6	3.4	47	24.5	4.81	323
MP-2	13	13.5	70.64	5/14/01						5.38	296
MP-2	13	13.5	70.64	3/27/03	72.9	2.11	2.66	50.2	52.8	5.783	395
MP-2	13	13.5	70.64	4/20/04						5.589	361
MP-2	13	13.5	70.64	5/2/05						5.43	208
MP-2	12	15	69.14	5/20/96	81	2.2	7.9	36	33	5.181	330
MP-2	12	15	69.14	5/14/01						5.34	222
MP-2	12	15	69.14	3/27/03	62.5	2.21	4.04	43.8	45.1	5.69	359
MP-2	12	15	69.14	4/20/04						5.399	373
MP-2	12	15	69.14	5/2/05						5.16	208
MP-2	11	17.5	66.64	5/20/96	86	3	6.8	37	26	4.88	387
MP-2	11	17.5	66.64	8/11/98	58.1	1.2	5.9	32	25.3	4.54	253
MP-2	11	17.5	66.64	5/14/01	46	1.2	4.2	26	61	5.09	230
MP-2	11	17.5	66.64	3/27/03	18	1.48	0.99	19.1	46.2	5.449	172
MP-2	11	17.5	66.64	4/20/04						5.195	356
MP-2	11	17.5	66.64	5/2/05	34	0.94	1.2	19	34	4.97	178
MP-2	10	20	64.14	5/20/96	79	3.3	7.2	39	44	4.91	402
MP-2	10	20	64.14	8/11/98	28.4	30	432	510	2000	4.24	4,685
MP-2	10	20	64.14	5/14/01	940	29	300	650	2400	4.57	5520
MP-2	10	20	64.14	3/27/03	87.8	6.83	45.6	84.3	363	5.063	1106
MP-2	10	20	64.14	4/20/04						4.645	7260
MP-2	10	20	64.14	5/2/05	260	6.7	75	140	790	5.10	1732
MP-2	9	22.5	61.64	5/20/96	49	1.9	12	45	100	4.9	423
MP-2	9	22.5	61.64	8/11/98	3086	280	1570	3000	16300	3.72	19,400
MP-2	9	22.5	61.64	5/14/01	4140	170	1.4	3000	10000	4.01	20000

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-2	9	22.5	61.64	3/27/03	362	31.3	180	291	1230	4.554	3790
MP-2	9	22.5	61.64	4/20/04						4.018	23000
MP-2	9	22.5	61.64	5/2/05	720	49	4900	810	3300	4.21	74.33
MP-2	8	24	60.14	5/20/96	50	2.5	13	53	100	4.87	443
MP-2	8	24	60.14	8/11/98	3161	300	1750	3000	18700	3.78	21,900
MP-2	8	24	60.14	5/14/01						4.01	20400
MP-2	8	24	60.14	3/27/03	375	32	215	364	1370	4.786	3880
MP-2	8	24	60.14	4/20/04						4.013	23700
MP-2	8	24	60.14	5/2/05						4.24	6454
MP-2	7	25.5	58.64	5/20/96	55	2.4	28	74	190	5.02	693
MP-2	7	25.5	58.64	8/11/98	3570	360	1750	3400	22100	3.74	24,150
MP-2	7	25.5	58.64	5/14/01	5040	230	1800	4100	20000	3.93	23000
MP-2	7	25.5	58.64	3/27/03	514	47	333	481	1810	4.719	5160
MP-2	7	25.5	58.64	4/20/04						3.996	24700
MP-2	7	25.5	58.64	5/2/05						4.21	7380
MP-2	6	27	57.14	5/20/96	500	48	320	700	2500	4.3	6,040
MP-2	6	27	57.14	8/12/98	5333	540	2500	6000	24000	3.92	30,450
MP-2	6	27	57.14	5/14/01						3.98	29800
MP-2	6	27	57.14	3/27/03	3570	330	633	3560	12000	4.198	24100
MP-2	6	27	57.14	4/20/04						3.974	28000
MP-2	6	27	57.14	5/2/05	2300	160	1600	2500	9000	3.99	18333
MP-2	4	30	54.14	5/20/96	11000	770	160	15000	52000	3.69	74,000
MP-2	4	30	54.14	8/12/98	11398	810	4520	13000	31100	3.87	53,600
MP-2	4	30	54.14	5/14/01	13800	770	3660	13000	65000	3.9	51500
MP-2	4	30	54.14	3/27/03	8800	675	360	8620	31700	3.829	49900
MP-2	4	30	54.14	4/20/04						3.784	47000
MP-2	4	30	54.14	5/2/05	2700	610	3900	7700	12000	3.73	43631

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-2	3	32.5	51.64	5/20/96	14000	850	210	18000	62000	3.5	87,500
MP-2	3	32.5	51.64	8/12/98	13710	960	5280	18000	35900	3.75	57,050
MP-2	3	32.5	51.64	5/14/01						3.75	59500
MP-2	3	32.5	51.64	3/27/03	12300	929	3980	12400	3340	3.698	64800
MP-2	3	32.5	51.64	5/2/05						3.60	65532
MP-2	2	35	49.14	5/20/96	16000	1100	390	22000	71000	3.46	96,300
MP-2	2	35	49.14	8/12/98	16828	1100	6430	26000	42800	3.63	58,300
MP-2	2	35	49.14	5/14/01						3.63	67300
MP-2	2	35	49.14	3/27/03	15800	1080	14.8	18900	60800	3.538	74500
MP-2	2	35	49.14	4/20/04						3.492	71900
MP-2	2	35	49.14	5/2/05						3.44	78925
MP-2	1	37.5	46.64	5/20/96	17000	940	140	24000	77000	3.39	102,600
MP-2	1	37.5	46.64	8/12/98	17903	1300	4120	25000	43100	3.57	57,550
MP-2	1	37.5	46.64	5/14/01	28800	500	12	7200	95000	3.68	72200
MP-2	1	37.5	46.64	3/27/03	18800	1210	5.18	19100	66200	3.612	79100
MP-2	1	37.5	46.64	4/20/04						3.527	76500
MP-2	1	37.5	46.64	5/2/05	4300	1300	12000	21000	20000	3.5	84925
MP-3	21	13.5	77	5/21/96	22	0.2	2.1	69	59	6.61	334
MP-3	21	13.5	77.0	8/12/98	57.7	<0.2	16.8	50	29	6.74	195
MP-3	21	13.5	77.0	5/14/01						6.28	101.5
MP-3	21	13.5	77	3/26/03						6.604	122.2
MP-3	21	13.5	77	4/21/04						6.828	211
MP-3	21	13.5	77	5/3/05						5.51	85
MP-3	20	15	75.5	5/21/96	39	0.88	3.4	97	120	6.06	408
MP-3	20	15	75.5	5/14/01						5.5	113
MP-3	20	15	75.5	3/26/03						6.529	190.6
MP-3	20	15	75.5	4/21/04						7.091	225

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-3	20	15	75.5	5/3/05						6.22	138
MP-3	19	16.5	74	5/21/96	48	0.91	6.8	140	170	6.1	688
MP-3	19	16.5	74.0	8/12/98	70.5	1.9	26.4	54	125	5.91	501
MP-3	19	16.5	74.0	5/14/01	107	2.6	0.13	69	90	5.66	656
MP-3	19	16.5	74	3/26/03	161	2.8	12.7	92.7	109	5.937	772
MP-3	19	16.5	74	4/21/04						6.094	623
MP-3	19	16.5	74	5/3/05	210	6.3	16	100	78	5.42	705
MP-3	18	18	72.5	5/21/96	35	1	3.9	62	81	6.08	368
MP-3	18	18	72.5	5/14/01						6.09	133
MP-3	18	18	72.5	3/26/03						6.258	243
MP-3	18	18	72.5	4/21/04						6.297	211
MP-3	18	18	72.5	5/3/05						5.61	275
MP-3	17	21.5	69	5/21/96	31	1.5	0.82	46	53	6.45	287
MP-3	17	21.5	69.0	8/12/98	13.7	0.84	1.48	12	11.9	6.21	95
MP-3	17	21.5	69.0	5/14/01						6.17	170
MP-3	17	21.5	69	3/26/03						6.132	333
MP-3	17	21.5	69	4/21/04						6.205	264
MP-3	17	21.5	69	5/3/05						5.54	258
MP-3	16	25	65.5	5/21/96	37	1.8	1.1	53	59	6.304	288
MP-3	16	25	65.5	5/14/01						5.92	291
MP-3	16	25	65.5	3/26/03						5.901	612
MP-3	16	25	65.5	4/21/04						5.887	620
MP-3	16	25	65.5	5/3/05						5.35	645
MP-3	15	28.5	62	5/21/96	37	1.7	2.9	64	88	6.07	405
MP-3	15	28.5	62.0	8/12/98	37.9	2.4	1.2	21	20.5	6.13	208
MP-3	15	28.5	62.0	5/14/01						6.03	349
MP-3	15	28.5	62	3/26/03						6.131	360

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-3	15	28.5	62	4/21/04						5.937	604
MP-3	15	28.5	62	5/3/05						5.45	656
MP-3	14	32	58.5	5/21/96	36	2	2	63	84	6.11	300
MP-3	14	32	58.5	5/14/01						5.6	284
MP-3	14	32	58.5	4/21/04						5.865	723
MP-3	13	34.5	56	5/21/96	33	1.1	4.6	50	72	5.636	282
MP-3	13	34.5	56.0	8/12/98	25.3	1.5	0.84	14	16.1	6.15	152
MP-3	13	34.5	56.0	5/14/01						5.99	374
MP-3	13	34.5	56	3/26/03						6.221	320
MP-3	13	34.5	56	4/21/04						5.942	553
MP-3	13	34.5	56	5/3/05	210	6.1	2.6	100	48	5.48	664
MP-3	12	36	54.5	5/21/96	39	1	8	50	64	6.09	375
MP-3	12	36	54.5	5/14/01						5.78	377
MP-3	11	37.5	53	5/21/96	78	2.4	24	80	120	5.69	561
MP-3	11	37.5	53.0	8/12/98	15.8	0.41	6.44	20	28	5.84	163
MP-3	11	37.5	53.0	5/14/01	104	2.9	31	76	83	5.65	605
MP-3	11	37.5	53	3/26/03	161	4.07	7.73	87.5	79	5.891	200
MP-3	11	37.5	53	4/21/04						5.944	571
MP-3	11	37.5	53	5/3/05						5.46	656
MP-3	10	39	51.5	5/21/96	110	3.4	45	87	160	5.68	925
MP-3	10	39	51.5	8/12/98	14.7	<0.2	2.66	38	21.3	6.38	186
MP-3	10	39	51.5	5/14/01						5.87	123
MP-3	10	39	51.5	3/26/03						7.044	192
MP-3	10	39	51.5	4/21/04						6.815	222
MP-3	9	40.5	50	5/21/96	150	5.4	60	120	260	5.21	1,183
MP-3	9	40.5	50.0	8/13/98	126.9	5.1	43.6	74	707	4.71	950
MP-3	9	40.5	50.0	5/15/01	119	2.7	13	83	97	5.47	684

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-3	9	40.5	50	3/26/03	161	3.18	14.5	97.1	130	5.728	851
MP-3	9	40.5	50	4/21/04						5.816	615
MP-3	9	40.5	50	5/3/05						5.41	687
MP-3	8	42	48.5	5/21/96	240	11	130	210	560	5.15	2,310
MP-3	8	42	48.5	8/13/98	215	10	96.4	130	873	4.50	1,503
MP-3	8	42	48.5	5/15/01	130	1.9	7.1	88	110	5.31	801
MP-3	8	42	48.5	3/26/03	201	3.78	58.4	114	240	5.722	1152
MP-3	8	42	48.5	4/21/04						5.739	682
MP-3	8	42	48.5	5/4/05						5.52	817
MP-3	7	43.5	47	5/21/96	900	79	910	1100	3900	4.56	11,650
MP-3	7	43.5	47.0	8/13/98	1108	78	738	830	6025	4.08	9,595
MP-3	7	43.5	47.0	5/15/01	1000	34	110	440	1600	4.65	4760
MP-3	7	43.5	47	3/26/03	62	49.5	1480	673	45.8	4.452	7110
MP-3	7 (dup)	43.5	47	3/26/03	57.8	50.7	694	644	41.8	4.45	7110
MP-3	7	43.5	47	4/21/04						5.303	1378
MP-3	7	43.5	47	5/4/05	250	6.7	50	120	210	5.33	1075
MP-3	6	45	45.5	5/21/96	1100	100	1200	1400	6900	4.43	15,410
MP-3	6	45	45.5	8/13/98	1540	120	934	3.2	9250	3.95	12,385
MP-3	6	45	45.5	5/15/01	2200	120	540	1300	5200	4.32	11830
MP-3	6	45	45.5	3/26/03	15.9	91.6	979	1140	41.2	4.443	11060
MP-3	6	45	45.5	4/21/04						4.468	10180
MP-3	6	45	45.5	5/4/05						4.13	13798
MP-3	5	47.5	43	5/21/96	1500	170	1400	1600	7100	4.27	19,080
MP-3	5	47.5	43.0	8/13/98	1978	170	1040	1500	9400	3.80	15,145
MP-3	5	47.5	43.0	5/15/01						4.14	14790
MP-3	5	47.5	43	3/26/03						4.29	14500
MP-3	5	47.5	43	4/21/04						4.267	13460



**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-3	5	47.5	43	5/4/05	430	210	1600	1800	1900	3.96	17518
MP-3	4	51	39.5	5/22/96	1900	340	2	2900	12000	4.05	25,800
MP-3	4	51	39.5	8/13/98	2650	280	1350	2100	14700	3.63	19,155
MP-3	4	51	39.5	5/15/01	4020	260	720	2300	12000	3.96	19310
MP-3	4	51	39.5	3/26/03	2830	252	589	2260	10300	4.125	18330
MP-3	4	51	39.5	4/21/04						4.059	16700
MP-3	4	51	39.5	5/4/05	24000	320	180	2600	83000	3.77	21555
MP-3	3	55.5	35	5/22/96	3400	600	34	6800	24000	3.8	27,400
MP-3	3	55.5	35.0	8/13/98	5183	570	2240	7100	23400	3.18	31,550
MP-3	3	55.5	35.0	5/15/01						3.82	32600
MP-3	3	55.5	35	3/26/03						3.554	33000
MP-3	3	55.5	35	4/21/04						3.473	33100
MP-3	3	55.5	35	5/4/05	540	620	3200	5700	5600	3.34	36504
MP-3	2	60	30.5	5/22/96	5000	830	29	12000	38000	3.71	60,600
MP-3	2	60	30.5	8/13/98	8650	720	3170	9000	28800	3.45	42,750
MP-3	2	60	30.5	5/15/01	13320	660	15	65000	32000	3.78	43900
MP-3	2	60	30.5	3/26/03	9280	913	68.3	10200	34100	3.88	43700
MP-3	2	60	30.5	4/21/04						3.796	47500
MP-3	2	60	30.5	5/4/05						3.66	52287
MP-3	1	65.5	25	5/22/96	12000	930	310	12000	48000	3.75	51,000
MP-3	1	65.5	25.0	8/13/98	11559	890	3880	11000	22400	3.47	48,050
MP-3	1	65.5	25.0	5/15/01						3.7	49700
MP-3	1	65.5	25	3/26/03						3.891	46800
MP-3	1	65.5	25	4/21/04						3.819	56200
MP-3	1	65.5	25	5/4/05	3200	1000	5200	13000	4500	3.69	62537
MP-4	14	24	72.47	6/28/00	32	1.9	2.5	180	12	5.93	117.4
MP-4	14	24	72.47	5/15/01	47	2.6	1	33	17	6.05	280

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

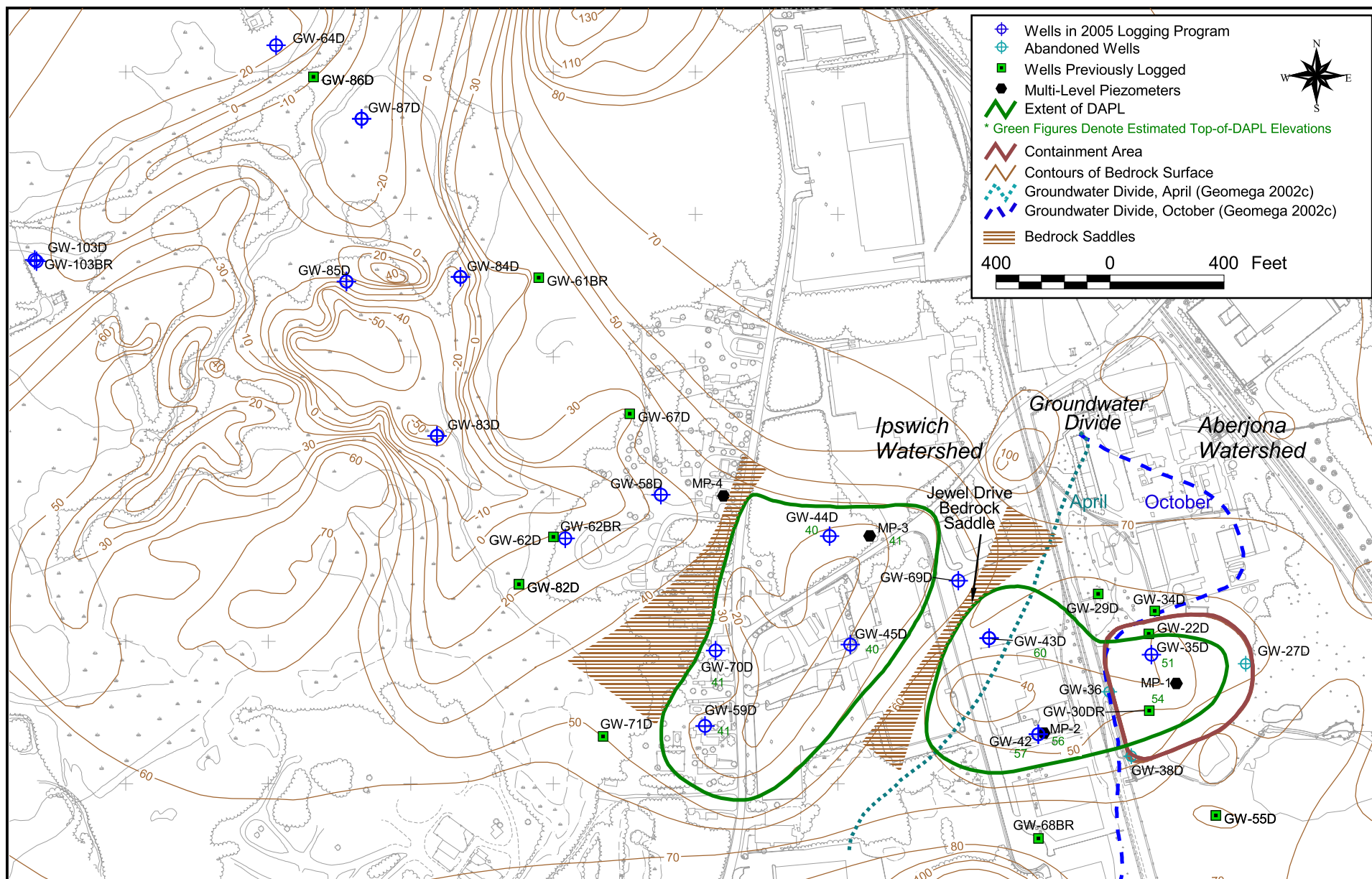
Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-4	14	24	72.47	4/10/02						6.36	586
MP-4	14	24	72.47	3/27/03	45.1	2.19	2.03	36.3	2.4	5.887	291
MP-4	14	24	72	4/20/04						5.778	1044
MP-4	14	24	72	5/4/05						5.31	1830
MP-4	13	39	57.47	6/28/00	62	2.2	9.2	51	15	6.19	378
MP-4	13	39	57.47	5/15/01	68	2.6	-0.1	42	25	5.95	386
MP-4	13	39	57.47	3/27/03	124	4	3.98	67.1	47.8	6.189	582
MP-4	13	39	57	4/20/04						5.944	1059
MP-4	13	39	57.47	5/4/05	570	8.2	3.5	280	44	5.67	1658
MP-4	13 (dup)	39	57.47	5/4/05	130	8.2	3.3	290	41	5.67	1658
MP-4	12	50	46.47	6/28/00	150		30		43	6.16	859
MP-4	12	50	46.47	5/15/01	100	3.4	13	86	50	6.46	651
MP-4	12	50	46.47	3/27/03	125	4.36	9.9	87.3	68.9	6.054	722
MP-4	12	50	46.47	4/20/04						6.074	1130
MP-4	12	50	46.47	5/4/05						5.95	1310
MP-4	11	55	41.47	6/28/00	490	23	120	330	760	6.41	2310
MP-4	11	55	41.47	5/15/01	430	24	156	340	1000	6.06	3200
MP-4	11	55	41.47	4/10/02						6.14	2150
MP-4	11	55	41.47	3/27/03	362	25.3	138	358	948	6.097	3270
MP-4	11	55	41.47	4/20/04						6.136	1799
MP-4	11	55	41.47	5/4/05						5.87	1477
MP-4	10	60	36.47	6/29/00	4100	180	1900	1800	7200	4.8	17,570
MP-4	10	60	36.47	5/15/01	3600	170	900	1800	8100	4.12	16360
MP-4	10	60	36.47	4/10/02						4.1	15470
MP-4	10	60	36.47	3/27/03	2210	197	1250	1880	7430	4.392	18290
MP-4	10	60	36.47	4/20/04						4.350	162.6
MP-4	10	60	36.47	5/4/05	930	160	9.8	1600	3700	4.19	14469

**Table 4. Historical multilevel piezometer data and vertical distribution of DAPL and diffuse zones.**

DAPL (Green), Diffuse (Blue), MP-4 Bedrock Ports (Tan)

Location	Port	Depth (ft bgs)	Elevation (ft MSL)	Date Sampled	Chloride (mg/l)	Magnesium (mg/l)	Ammonia (mg/l)	Sodium (mg/l)	Sulfate (mg/l)	pH (field - S.U.)	SC (field - mmhos/cm)
MP-4	9	64	32.47	6/29/00	4500	280	2100	2600	9200	4.5	22,500
MP-4	8	74	22.47	6/29/00	6700	640	2100	3300	9500	5.5	16,700
MP-4	5	110	-13.53	6/29/00	7300	280	1100	5100	11000	6	26,900
MP-4	5	110	-13.53	5/15/01	7100	760	94	4400	17000	6.47	24800
MP-4	5	110	-13.53	4/10/02						4.55	29300
MP-4	5	110	-13.53	3/28/03	5350	613	952	3750	15200	5.064	15020
MP-4	5	110	-13.53	4/20/04						4.768	29100
MP-4	5	110	-13.53	5/4/05	1300	610	15	4600	4100	4.65	29874
MP-4	3	143	-46.53	6/29/00	4100	280	650	1500	5200	5.5	15,000
MP-4	3	143	-46.53	5/15/01	4000	410	4.1	1800	4800	5.8	15200
MP-4	3	143	-46.53	3/28/03	2970	385	578	1480	4900	6.269	10330
MP-4	3	143	-46.53	4/20/04						6.519	15300
MP-4	3	143	-46.53	5/4/05	720	380	6.8	1600	1200	6.28	14866
MP-4	2	155	-58.53	6/29/00	4000	230	2100	2400	6400	5.9	14,700
MP-4	2	155	-58.53	5/15/01	3600	470	780	2200	5000	5.88	16400
MP-4	2	155	-58.53	4/10/02						3.25	14600
MP-4	2	155	-58.53	3/28/03	2870	380	493	1450	4630	6.124	9680
MP-4	2	155	-58.53	4/20/04						6.410	12700
MP-4	2	155	-58.53	5/4/05	1500	380	5.1	1500	2500	6.08	14464
MP-4	1	166	-69.53	6/29/00	4900	140	490	4400	9100	6	19,500
MP-4	1	166	-69.53	5/15/01	4700	290	118	3400	5000	7.08	20900
MP-4	1	166	-69.53	3/28/03	3190	459	546	1850	5830	6.179	9940
MP-4	1	166	-70	4/20/04						6.442	12590
MP-4	1	166	-70	5/4/05						6.19	15540



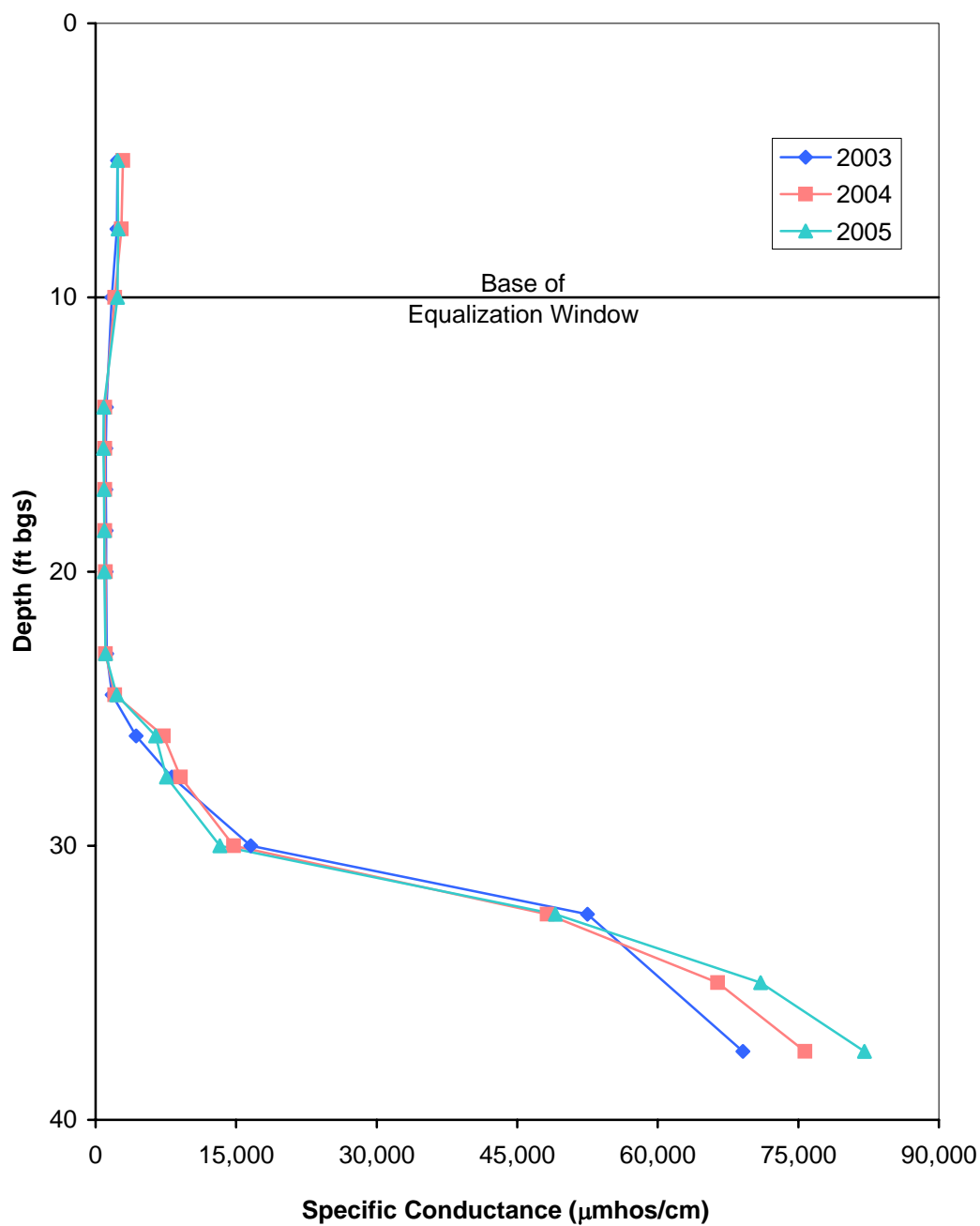


9/16/05

C03303b  
Olin OEMI

Locations of multilevel piezometers and wells in the long-term induction logging network.

Figure  
1

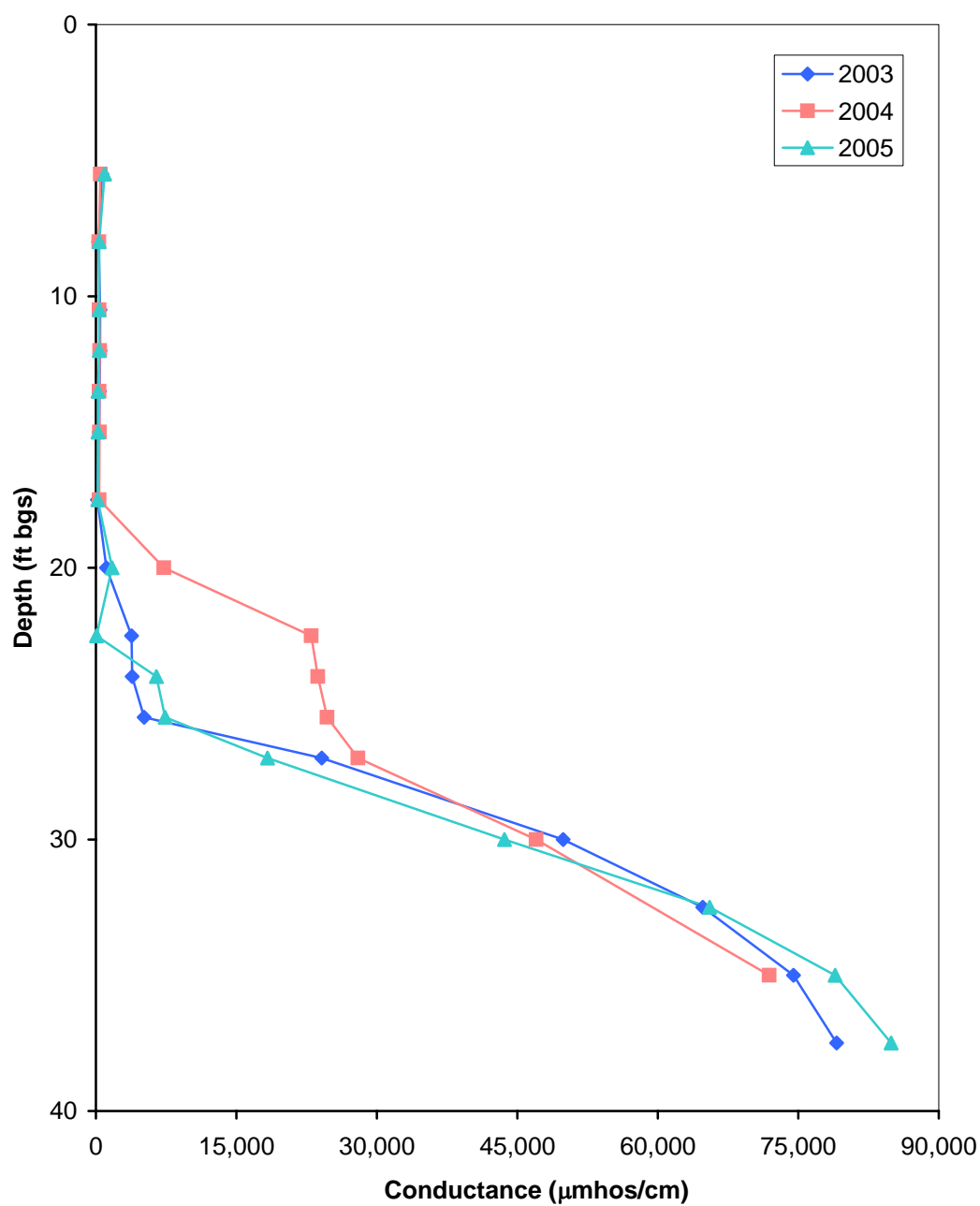


9/13/05

C03303B  
Olin

Comparison of specific conductance  
measurements in MP-1 from 2003, 2004 and 2005.

**Figure**  
2

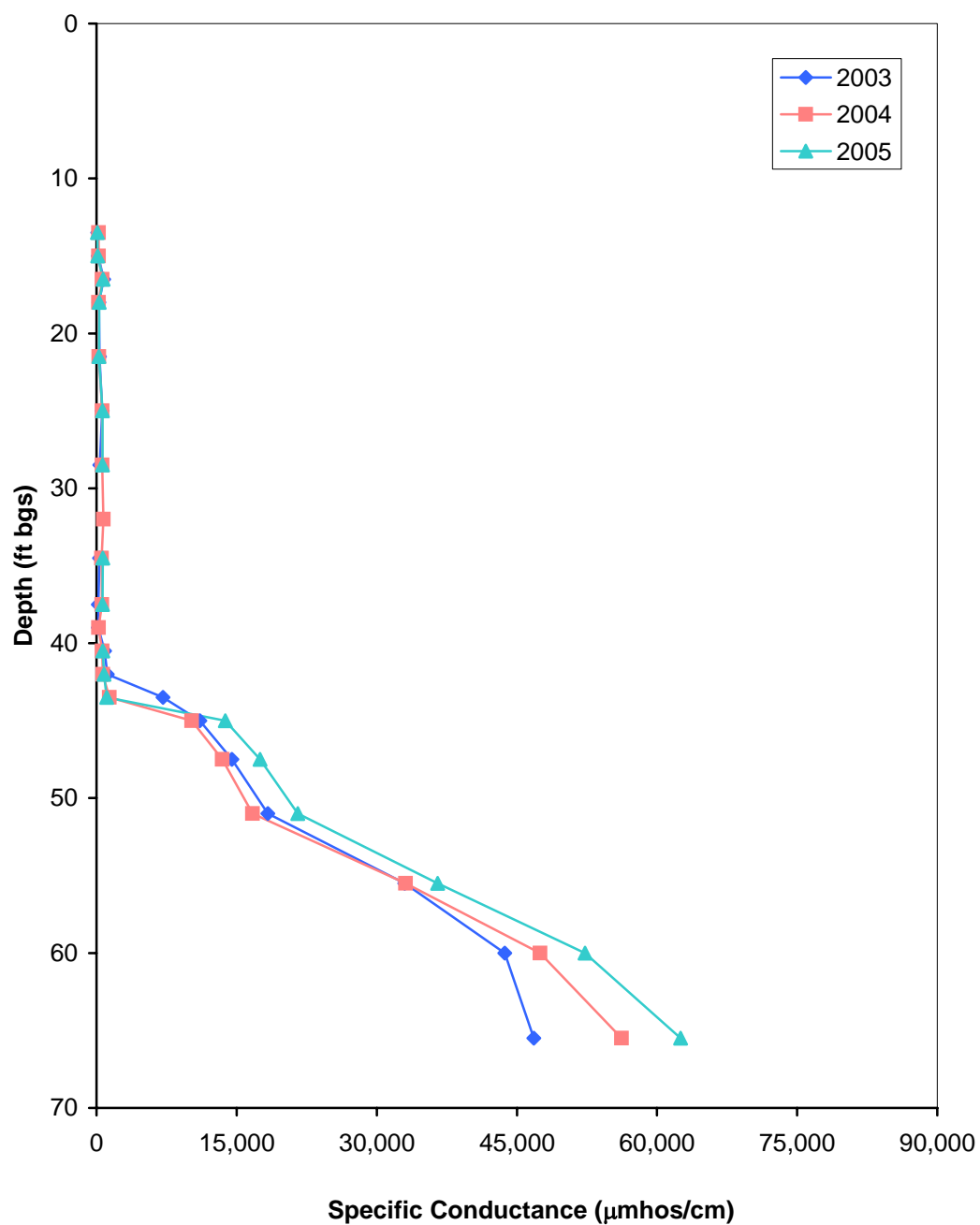


9/13/05

C03303B  
Olin

Comparison of specific conductance  
measurements in MP-2 from 2003, 2004 and 2005.

**Figure**  
3



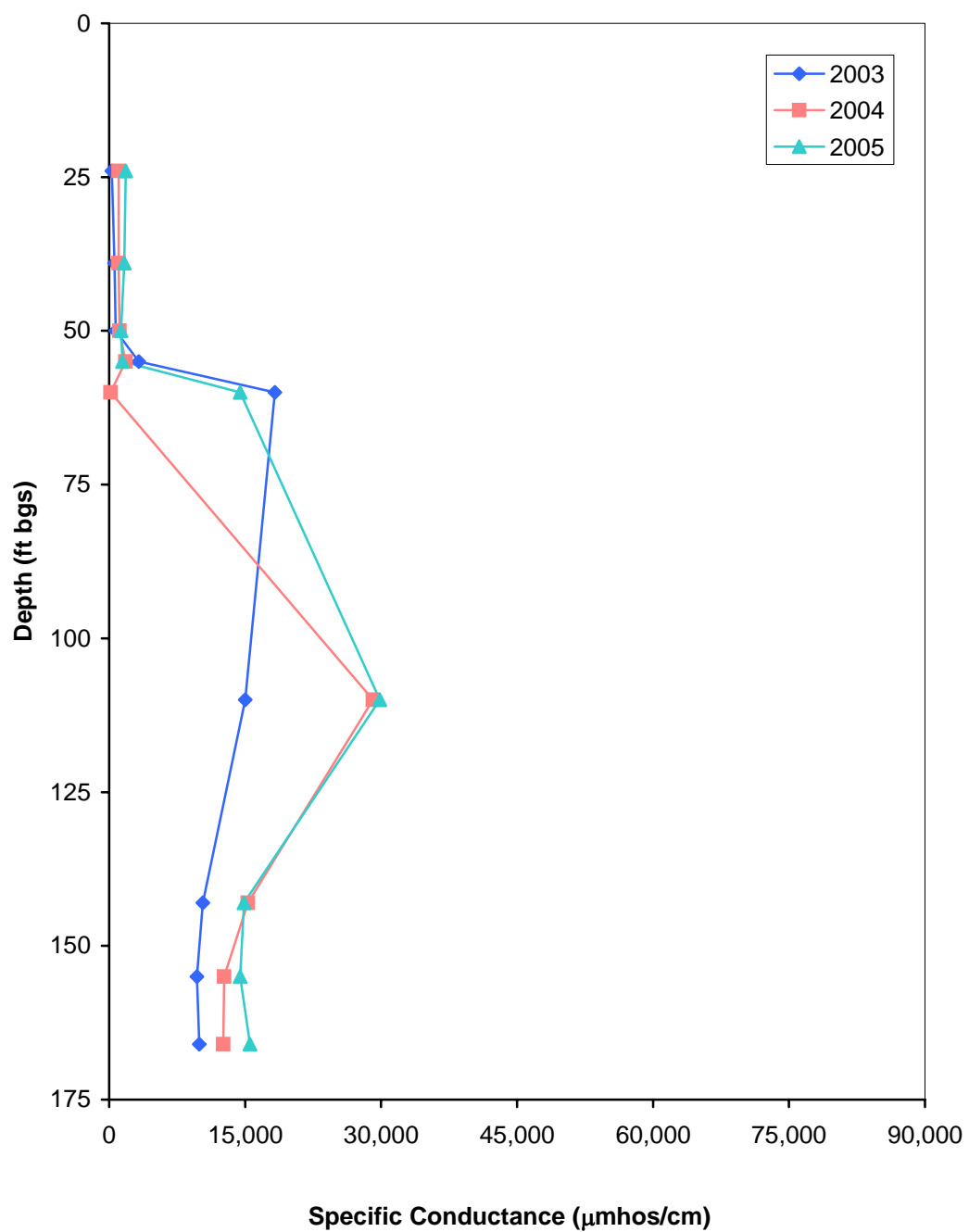
9/13/05

C03303B  
Olin

Comparison of specific conductance  
measurements in MP-3 from 2003, 2004 and 2005.

**Figure**  
4



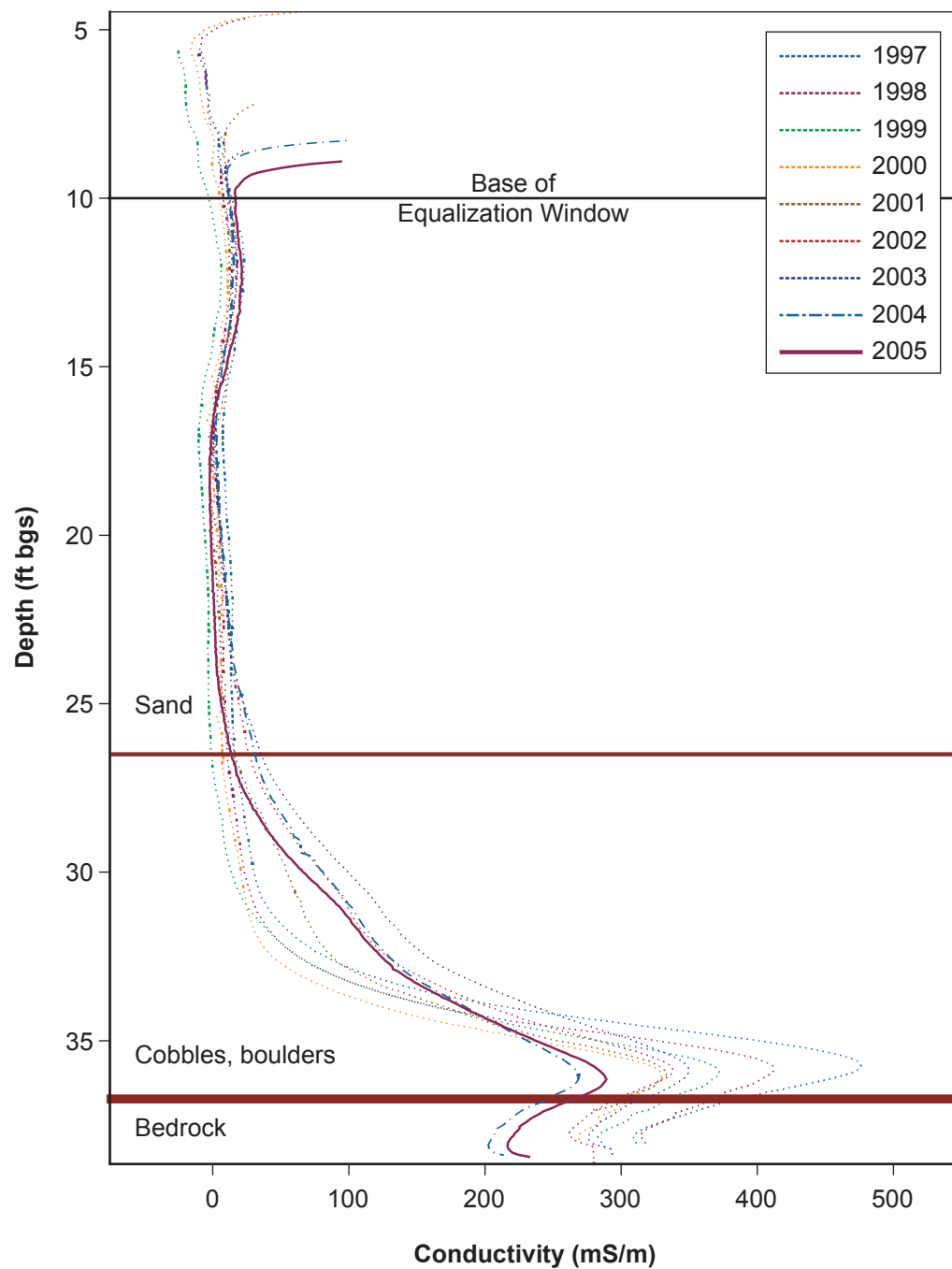


9/13/05

C03303B  
Olin

Comparison of specific conductance  
measurements in MP-4 from 2003, 2004 and 2005.

**Figure**  
**5**

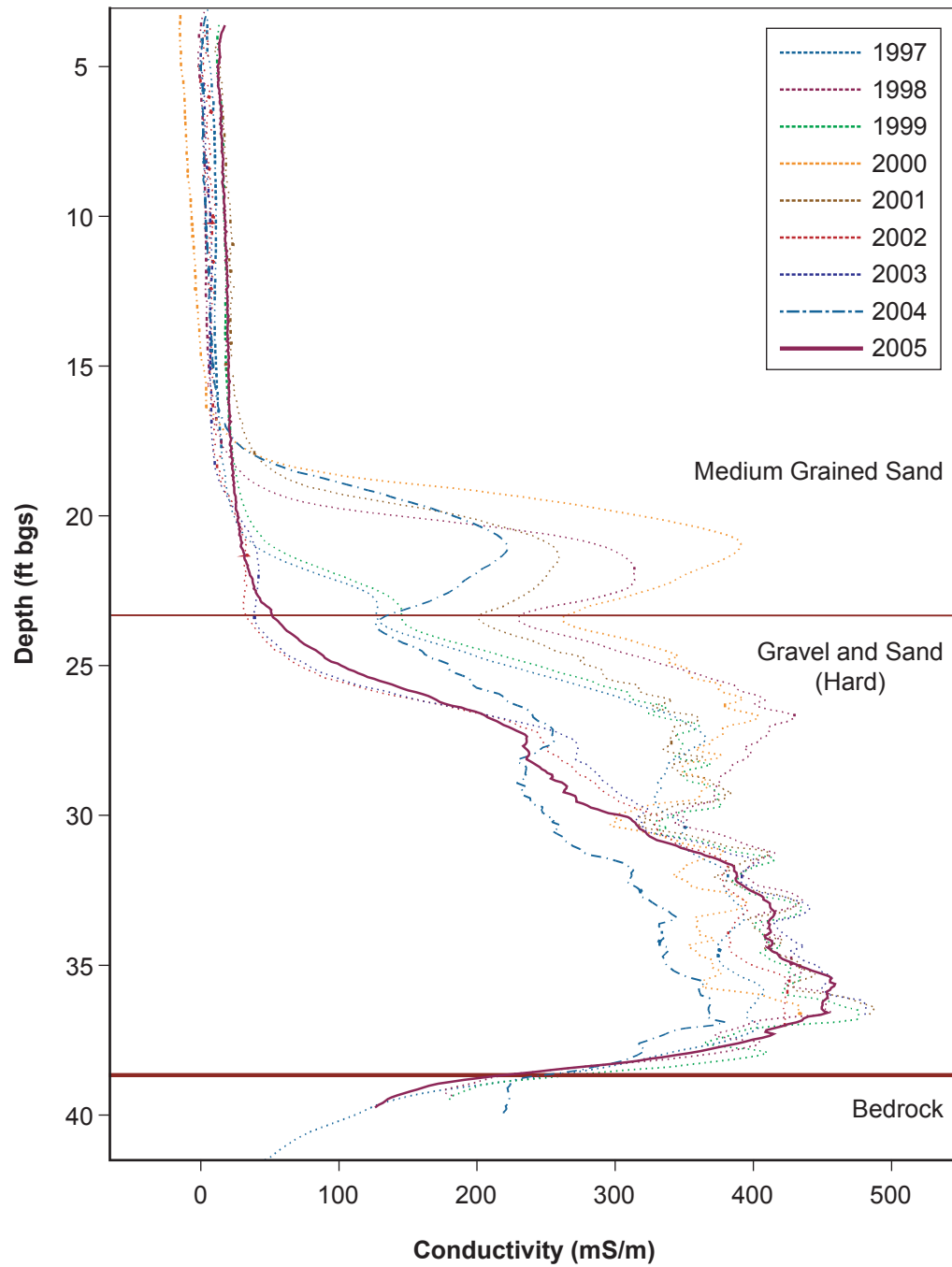


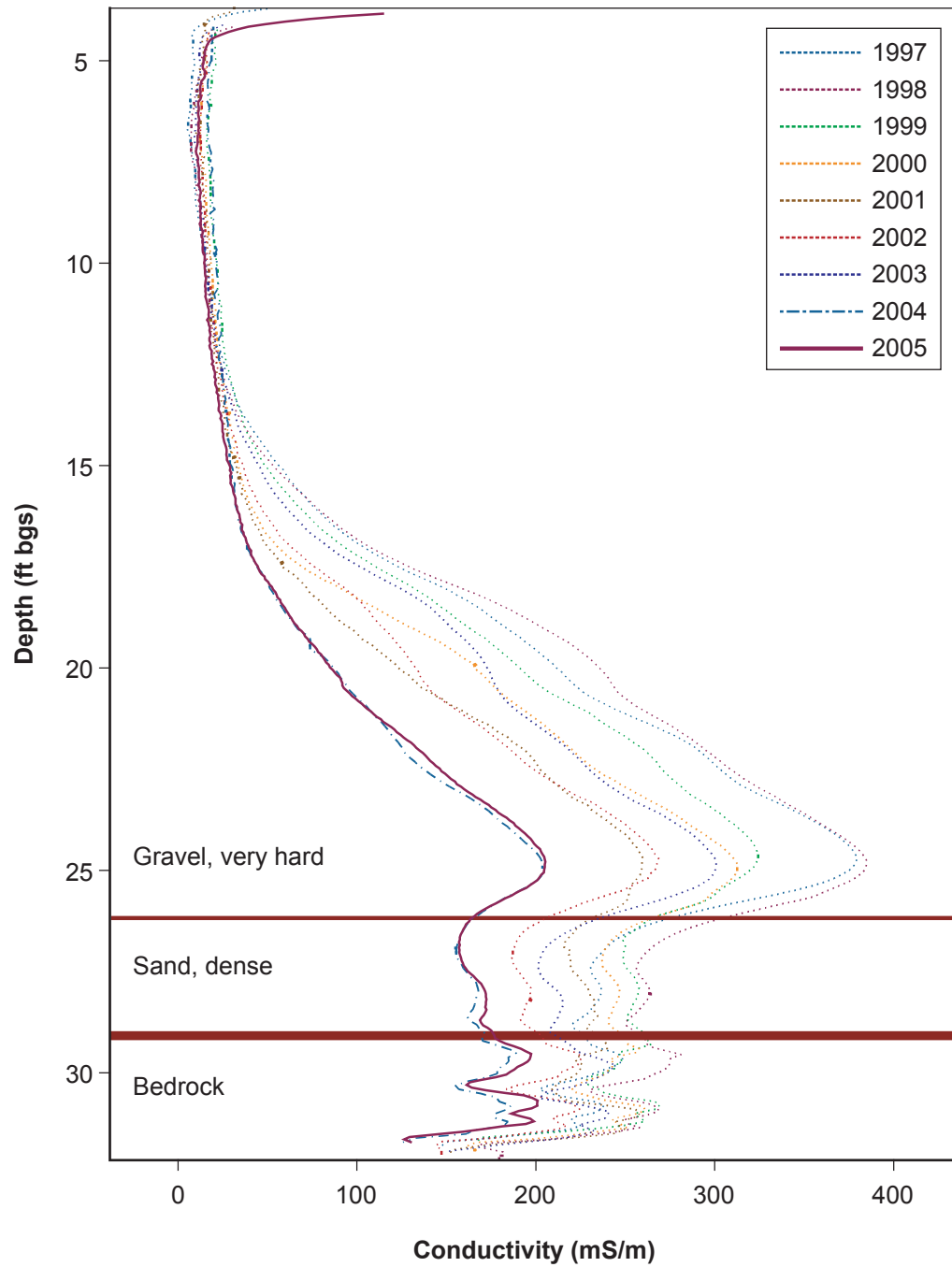
9/13/05

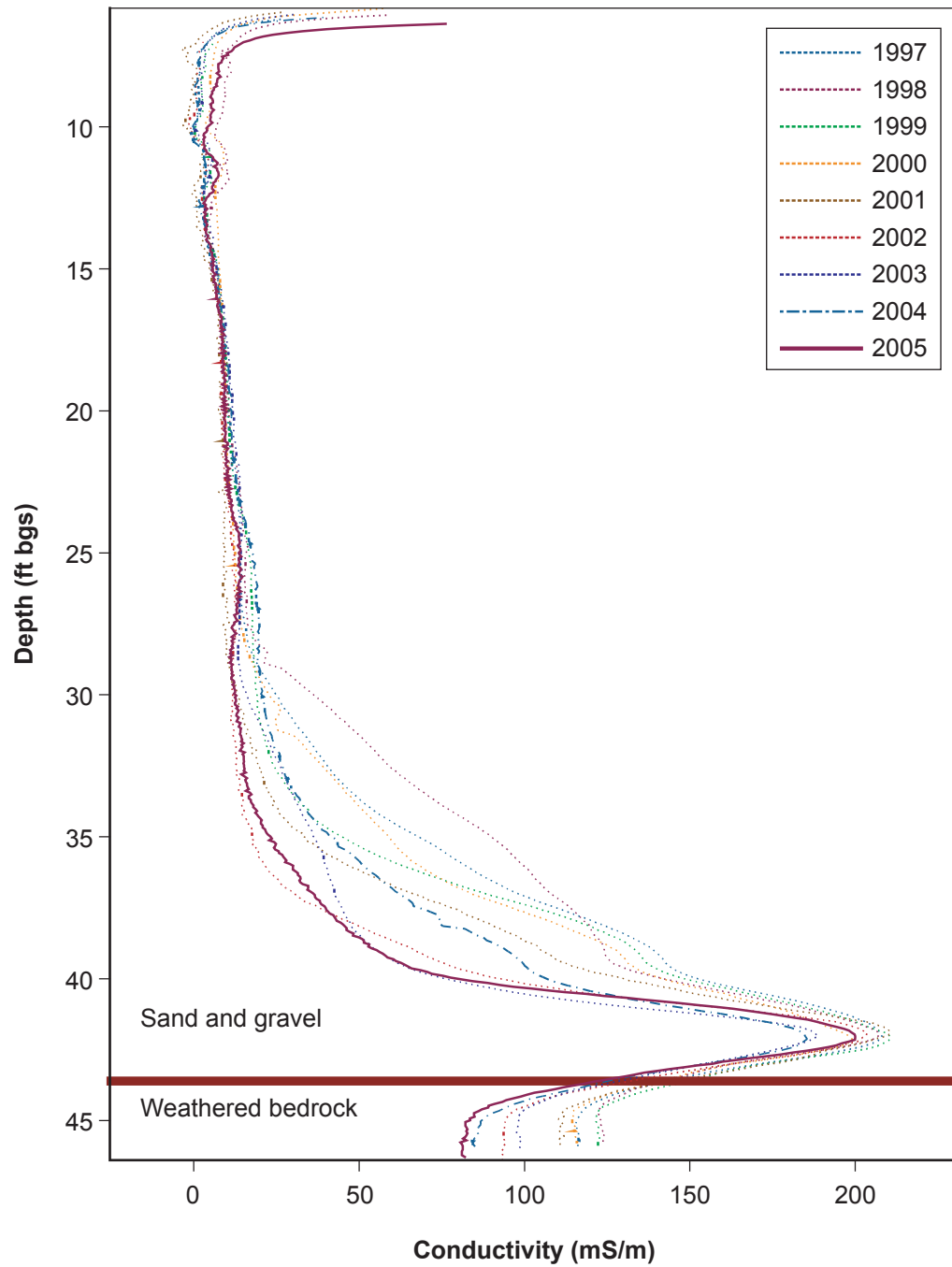
C03303B  
Olin

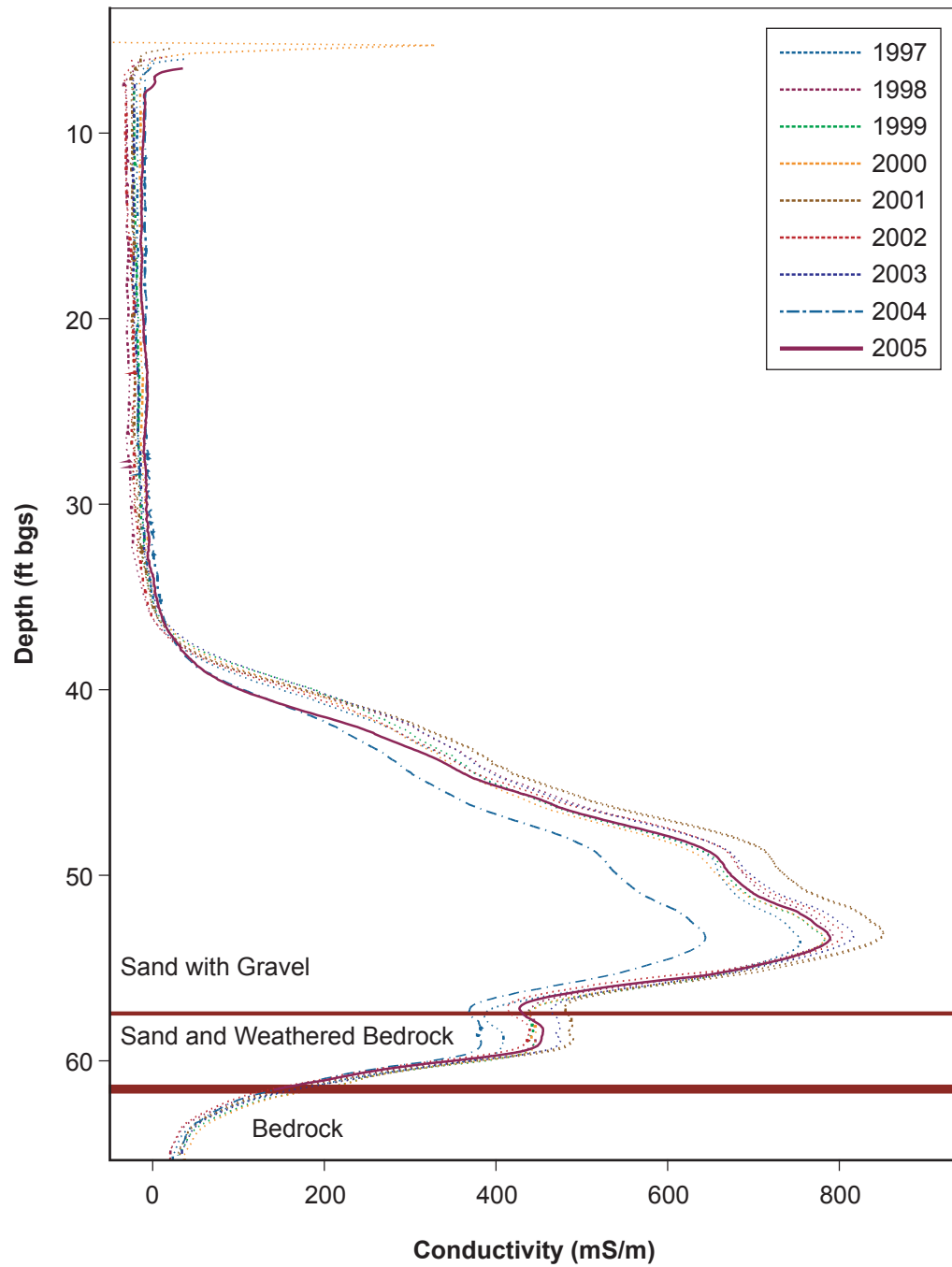
GW-35D induction log results (on-property DAPL).

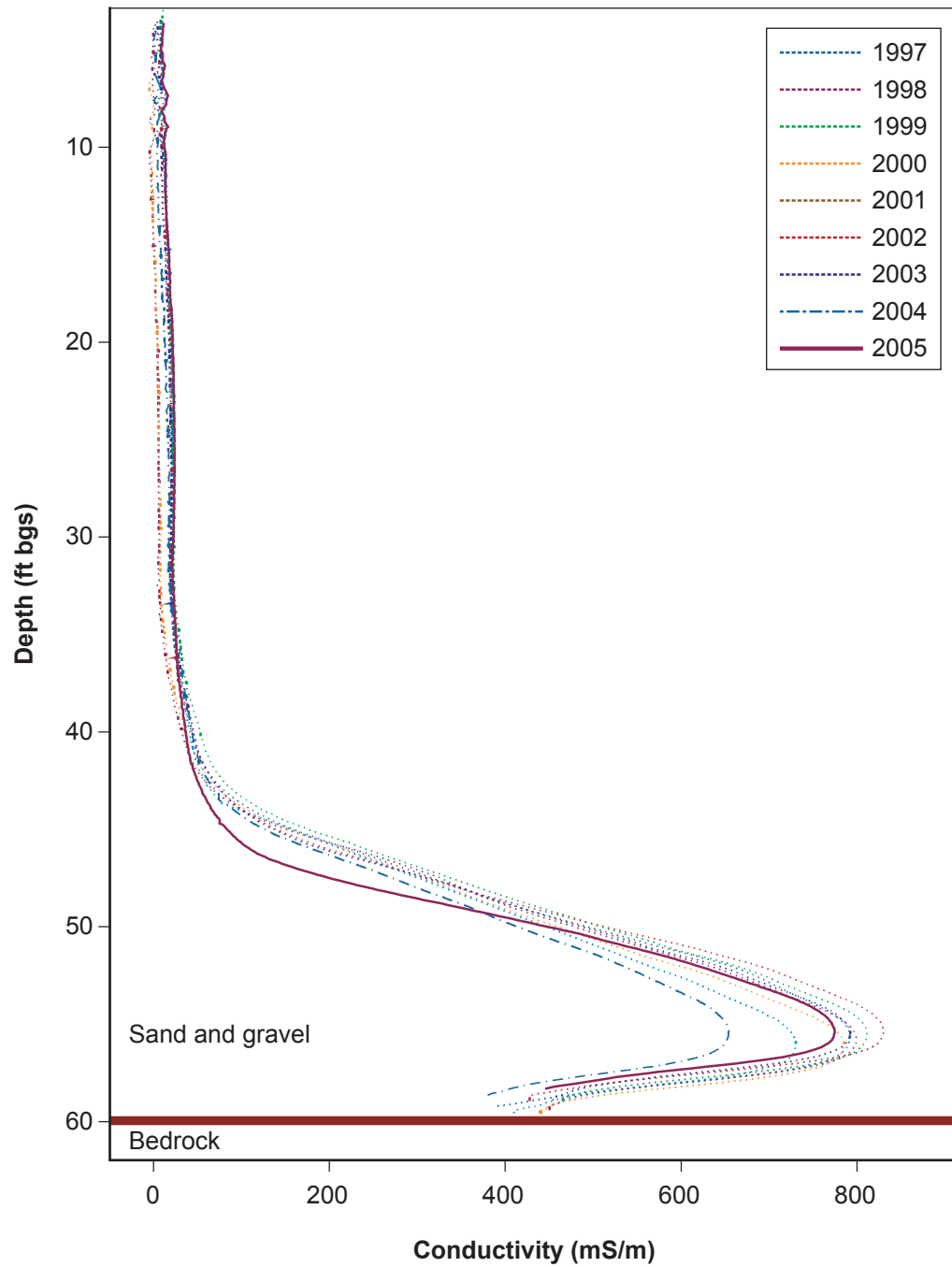
**Figure**  
6

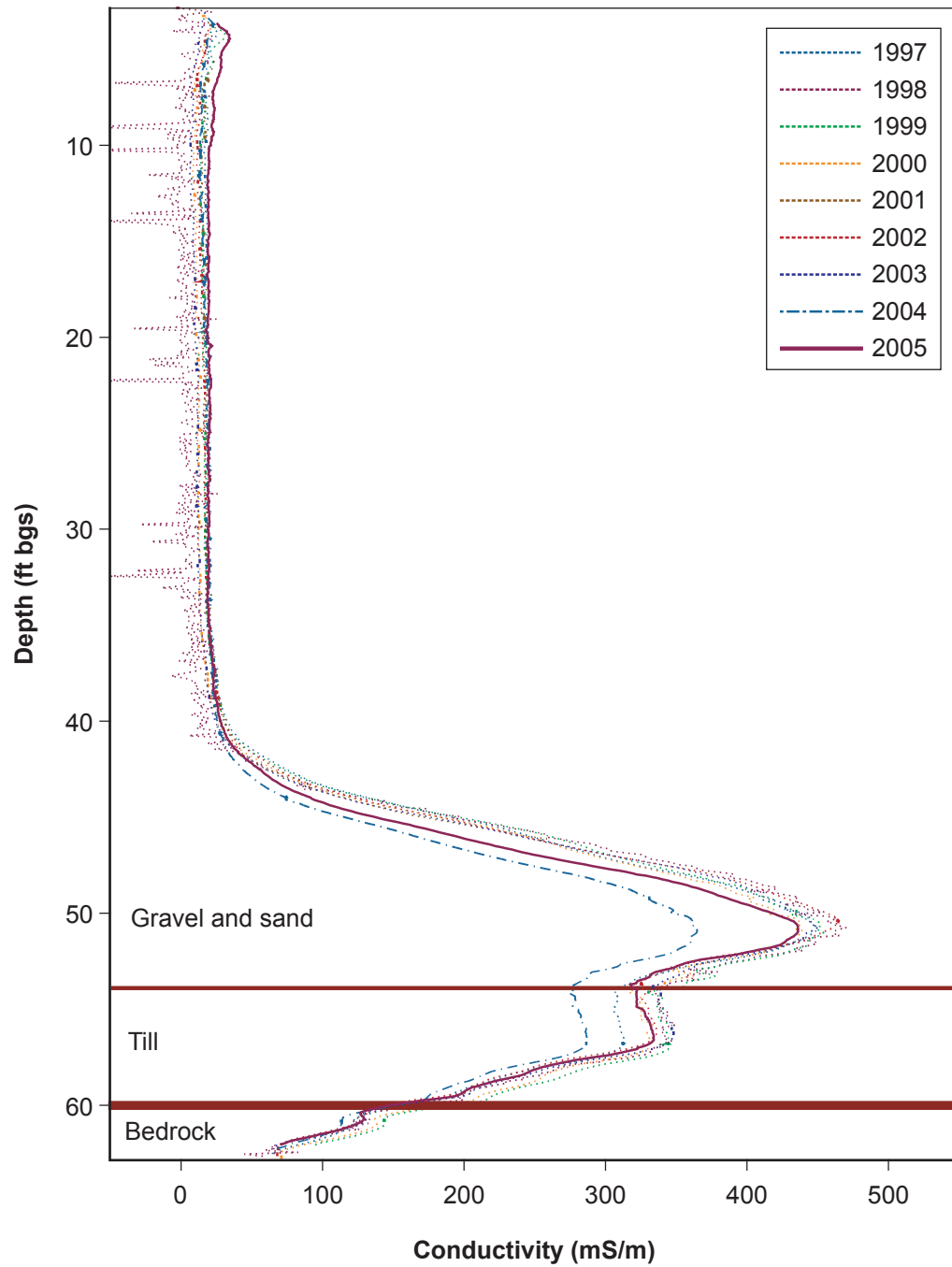




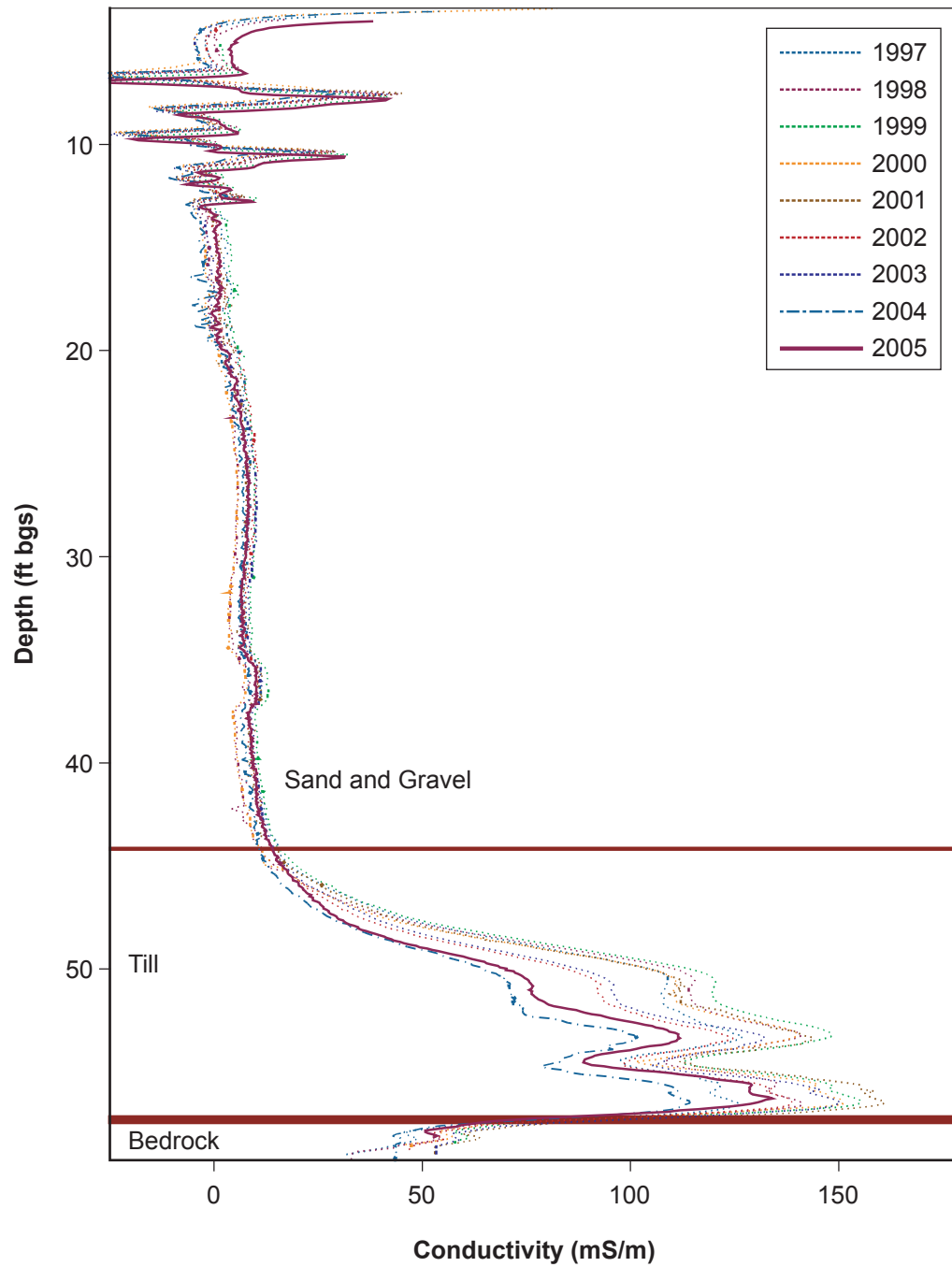










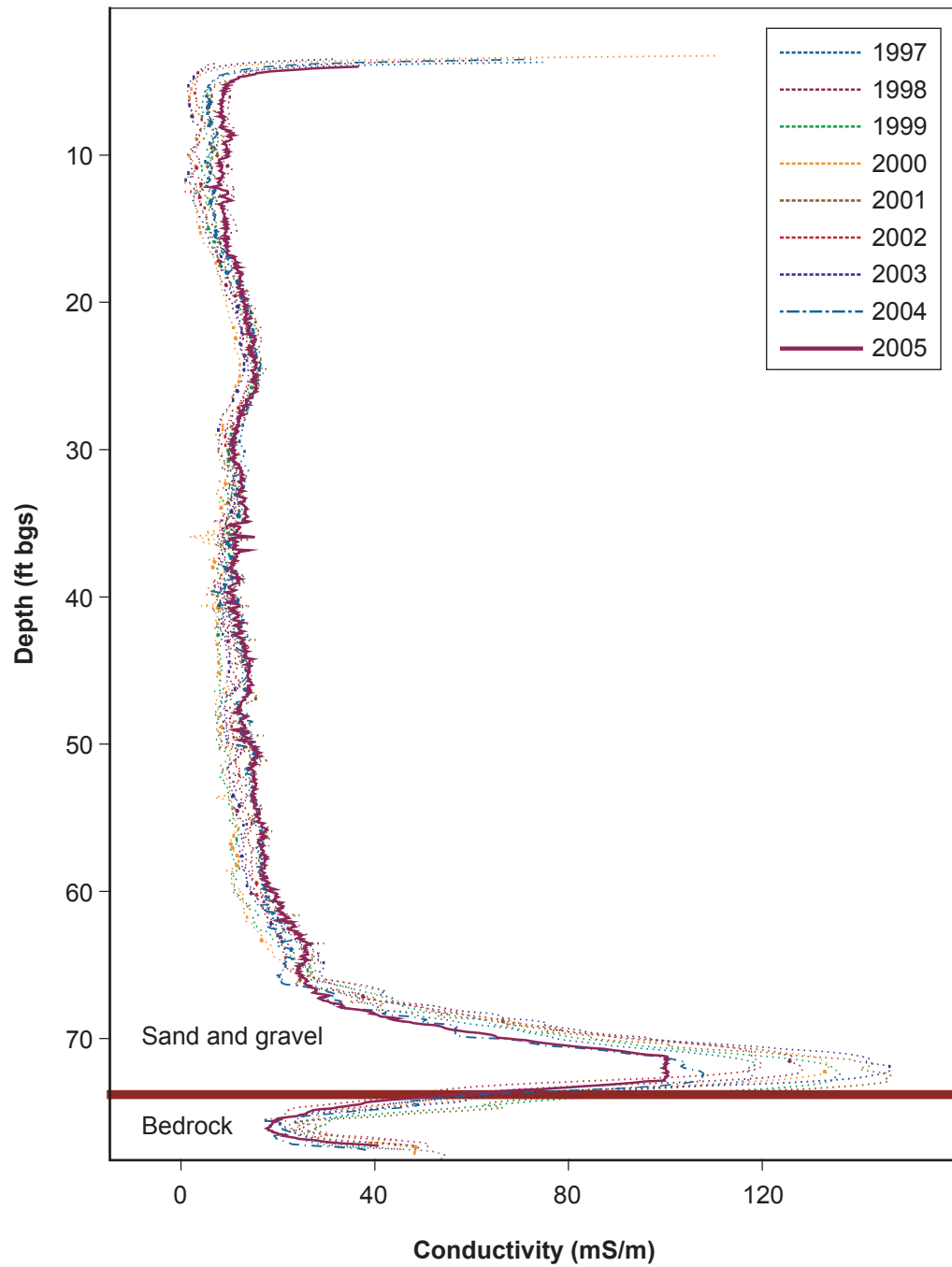


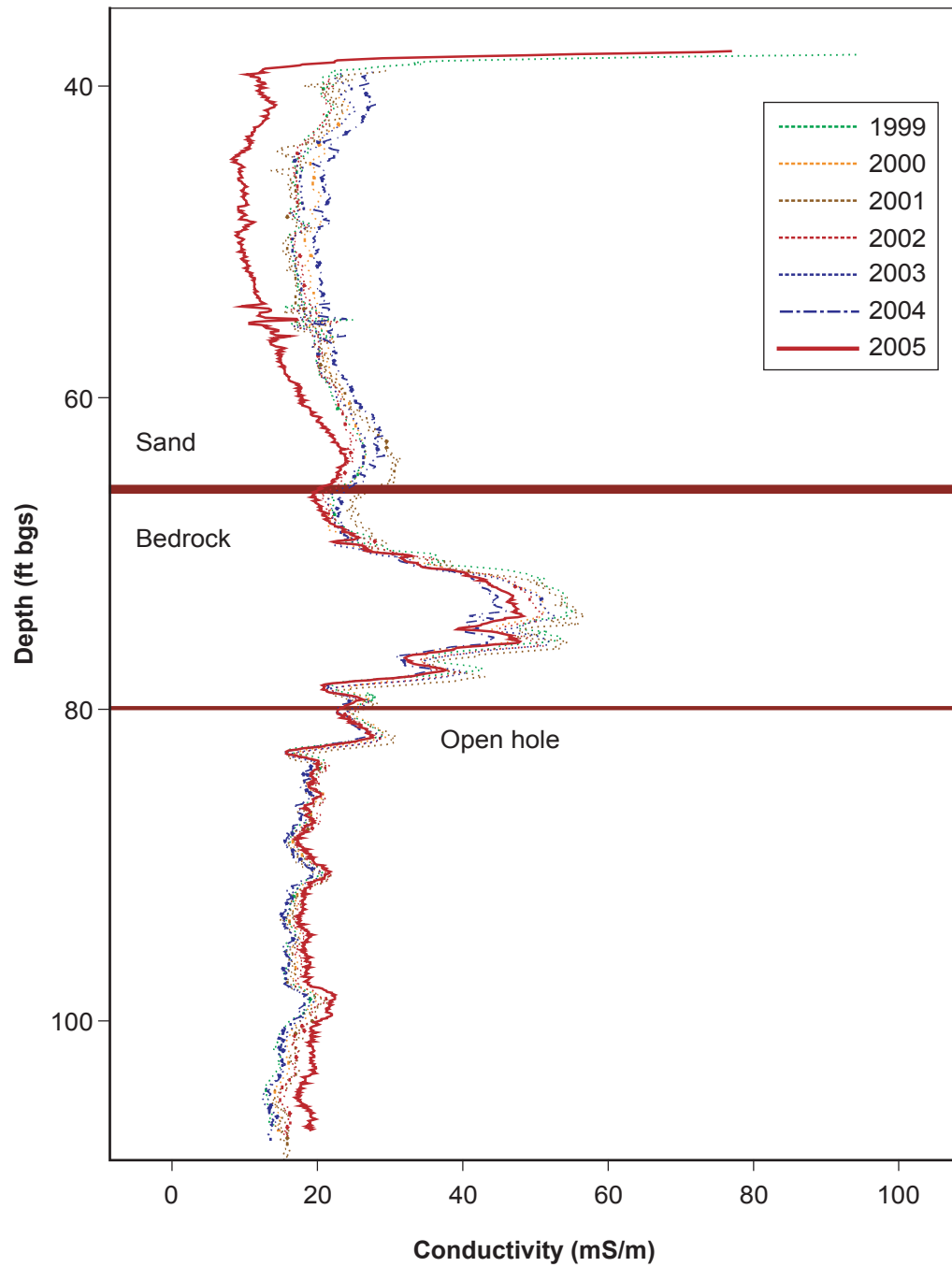
9/13/05

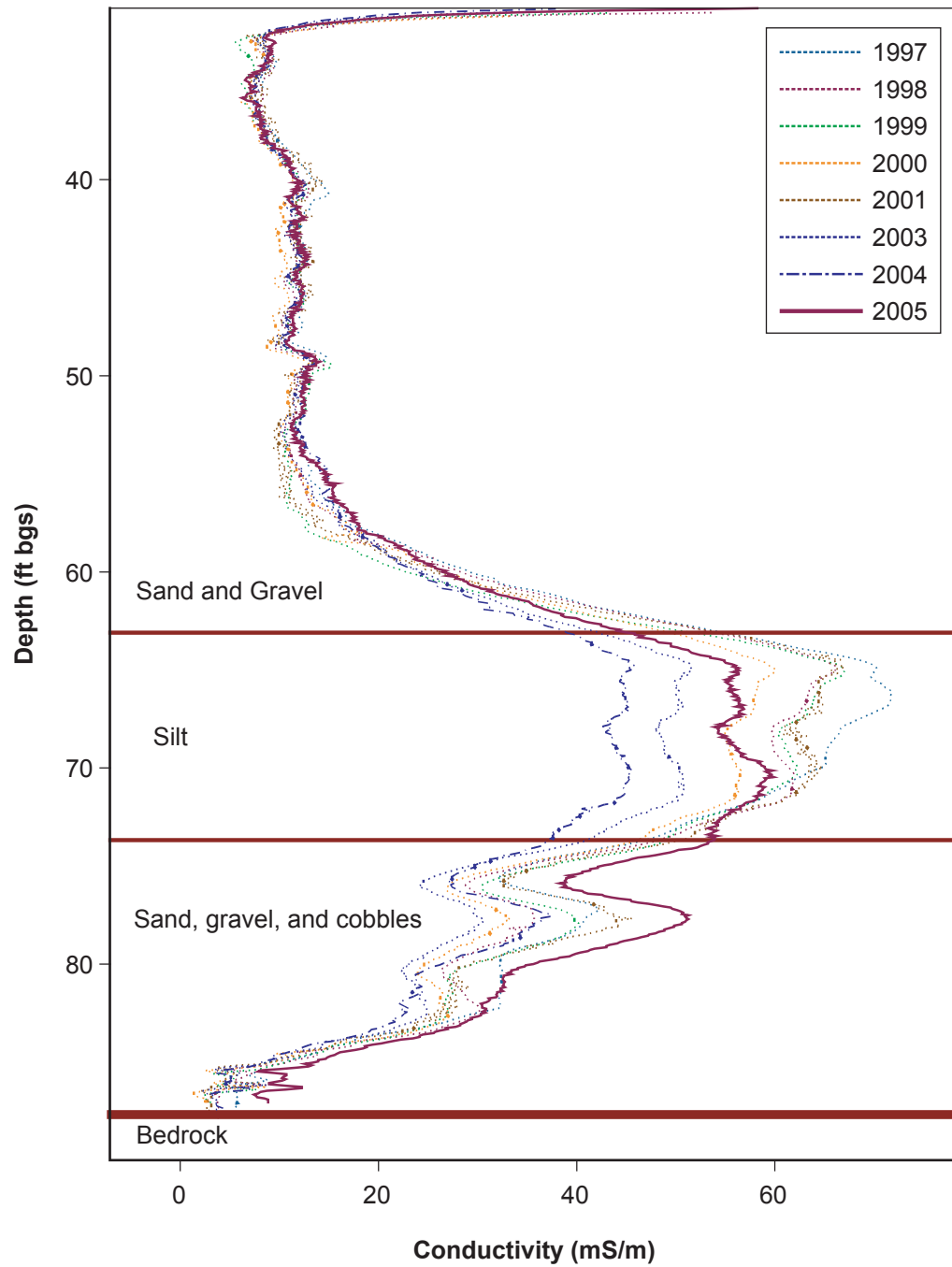
C03303B  
Olin

GW-70D induction log results  
(off-property DAPL, lower pool).

**Figure**  
13





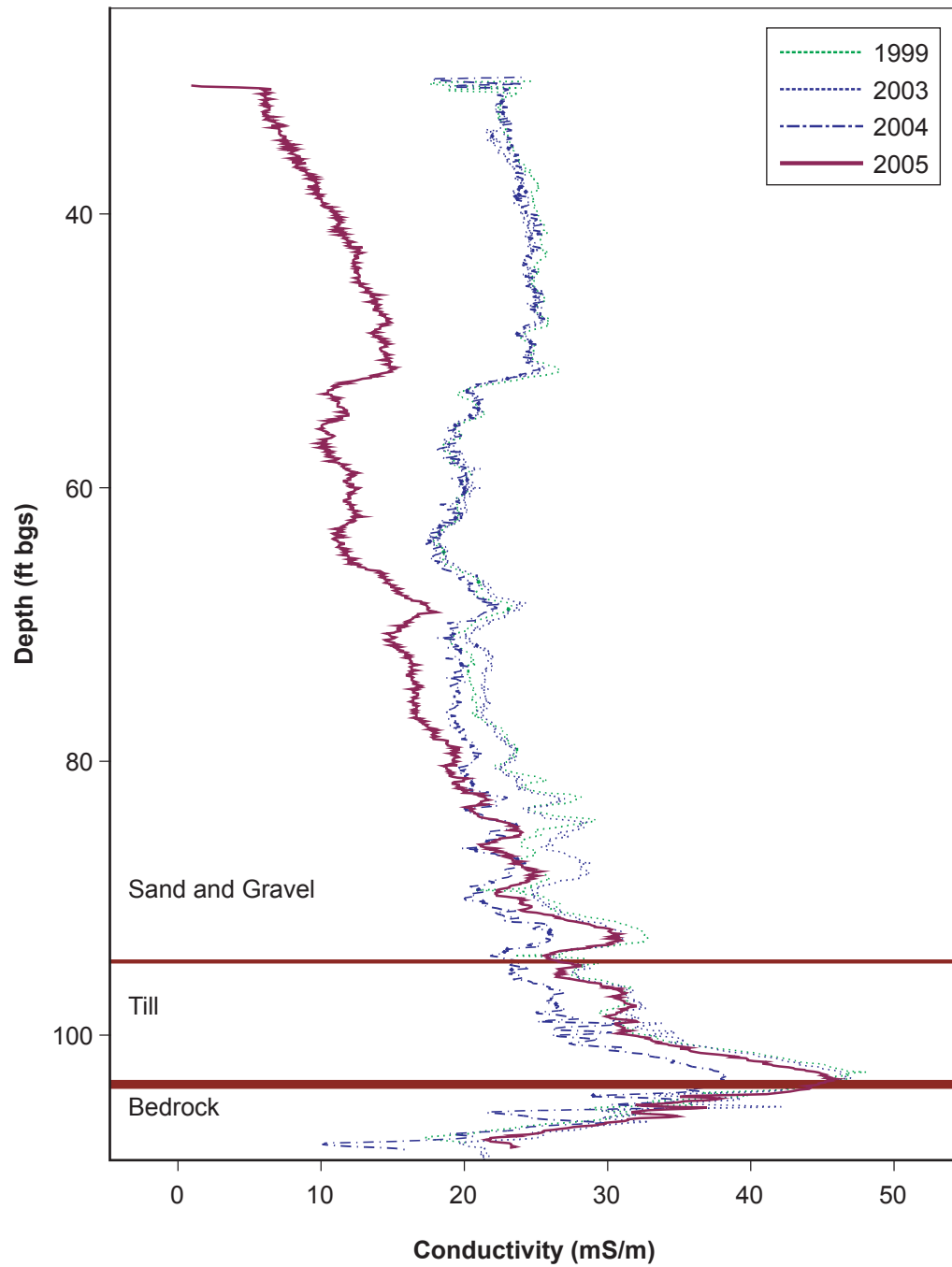


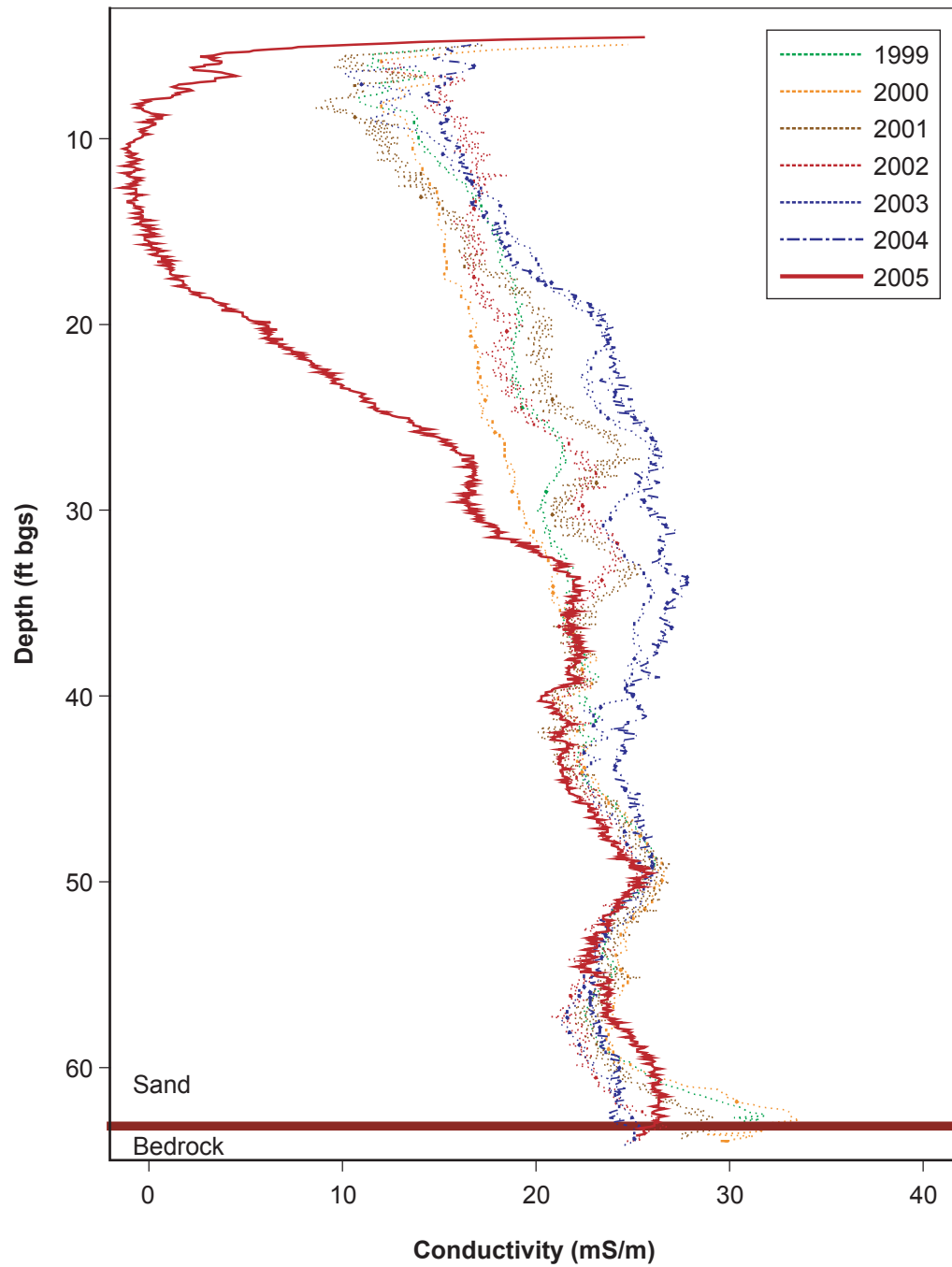
9/13/05

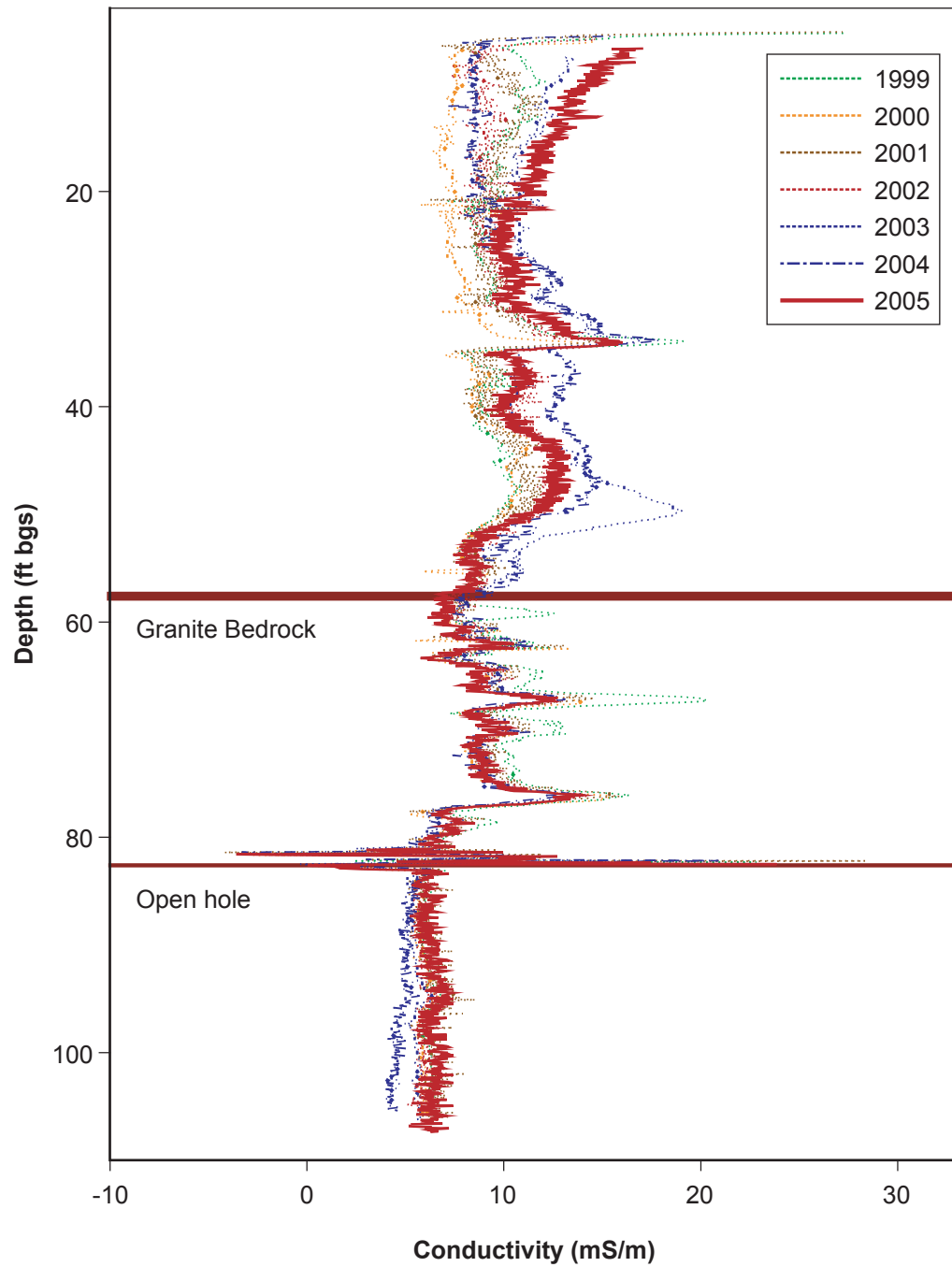
C03303B  
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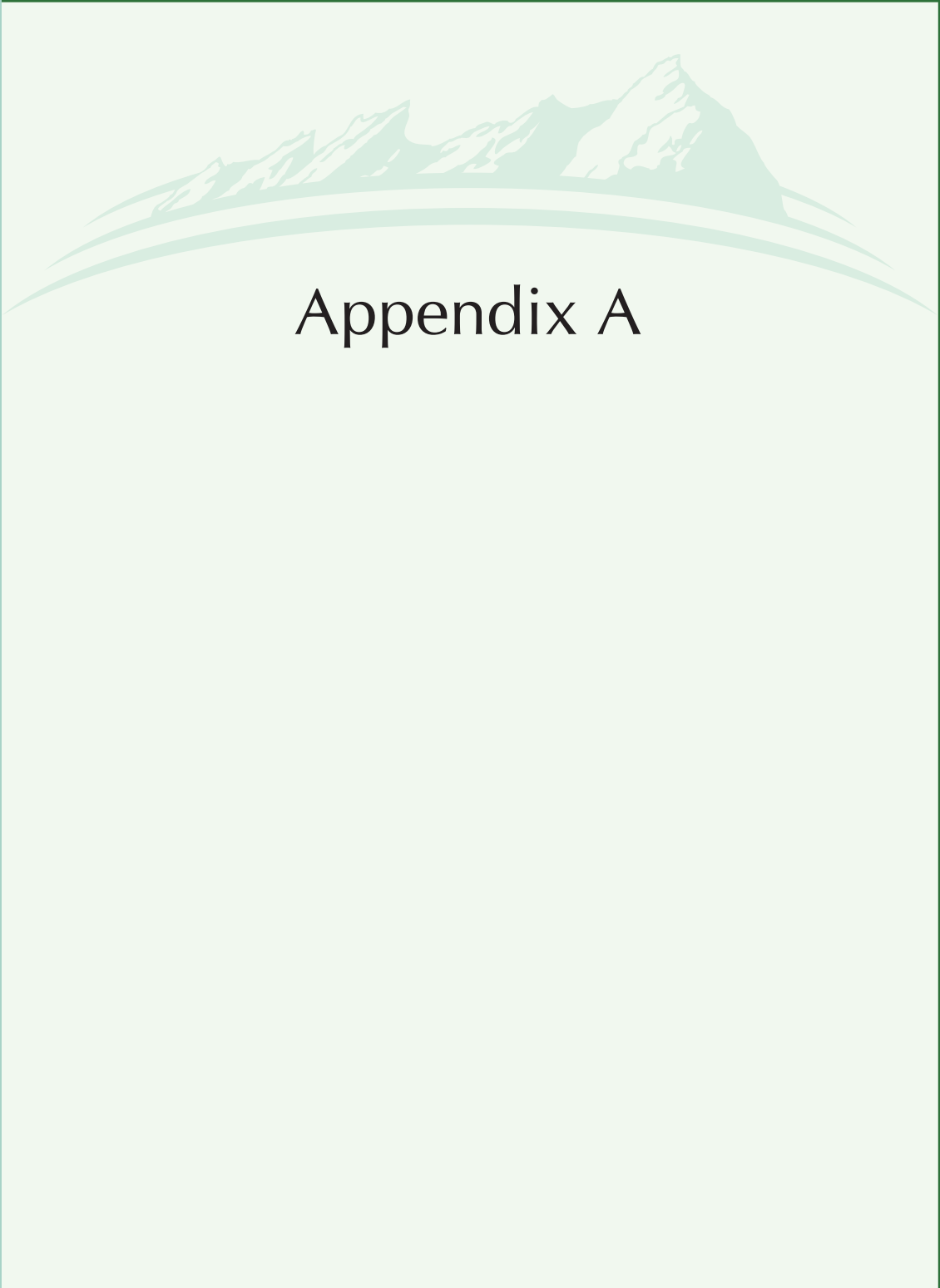
GW-85D induction log results (Western Bedrock Valley).

**Figure**  
16











To: Margret Hanley and Steve Morrow  
From: Chris Ricardi  
Date: 5/24/05  
Subject: Geomega Column Testing

**Data Validation Summary**  
**STL Data Sets 225093, 225138, 225191, and 225228**

These sample sets contained results for water samples identified as MP-1 Port 1, 4, 5, 5B, 6, 7, 8, and 17, MP-2 Port 1, 4, 6, 9, 10, 11, and 15, MP-3 Port 1, 3, 4, 5, 7, 13, and 19, and MP-4 Port 2, 3, 5, 10, 13, and 13B. Samples were collected in May 2005. Samples were analyzed by Severn Trent Laboratories (STL) in Westfield, Massachusetts. The analytical program included analysis for dissolved metals (calcium, iron, magnesium, sodium, aluminum, and chromium), and general chemistry analysis for ammonia, chloride, sulfate, nitrate, and nitrite. Results for specific gravity were also reported in the data package.

The Olin Wilmington QAPP was used as a reference during the review. Analytical packages were reviewed using the Level 1 Data Quality Evaluation checklists that were developed for the Olin Wilmington annual and quarterly groundwater monitoring tasks.

**Validation Actions and Observations**

No data quality issues were identified and results were interpreted to be usable as reported by the laboratory.

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Reviewer/Date W. J. K. L. L. L. 6/30/05  
Sr. Review/Date Chris Riccardi 7/25/05  
Lab Report # 225138, 225228, 225093, 225791  
Project # 630003 COC 8. 23.03

chloride, sulfate, nitrite, ammonia, nitrate, specific gravity

**Note:** The following analyses will be evaluated according to the "MADEP QA/QC Guidelines for Sampling, Data Evaluation and Reporting Activities." MADEP, however, may not list QA/QC criteria for every chemical analysis. Where not defined by MADEP, criteria will default to values stipulated in the QAPP. Where the QAPP does not define criteria, QA/QC requirements will default to limits employed by the laboratory.

### 1.0 Laboratory Deliverable Requirements

**1.1 Laboratory Information:** Was all of the following provided in the laboratory report? Yes ☒ No ☐ N/A ☐ Comments:

☒ Name of Laboratory ☒ Address ☒ Project ID ☒ Phone # ☒ Sample Identification – Field and Laboratory  
Client Information: ☒ Name ☒ Address ☒ Client Contact (IDs must be cross-referenced)

**ACTION:** If no, contact lab for submission of missing or illegible information.

### 1.2 Laboratory Report Certification Statement

Does the laboratory report include a completed Analytical Report Certification in the required format? Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, contact lab for submission of missing certification or certification with correct format.

### 1.3 Laboratory Case Narrative:

Yes ☒ No ☐ N/A ☐ Comments:

☒ Narrative serves as an exception report for the project and method QA/QC performance. ☒ Narrative includes an explanation of each discrepancy on the Certification Statement.

**ACTION:** If no, contact lab for submission of missing or illegible information.

**1.4 Chain of Custody (COC)** copy present with all documentation completed? Yes ☒ No ☐ N/A ☐ Comments:

Does the laboratory report include copies of Chain of Custody forms containing all samples in this SDG?

**NOTE:** Olin receives and maintains the *original* COC.

**ACTION:** If no, contact lab for submission of copy of missing completed COC.

**1.5 Sample Receipt Information (Cooler Receipt Form):** Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory?

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Yes ☒ No ☐ N/A ☐ Comments:

☒ Sample temperature confirmed: must be 1° - 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply).

☒ Container type noted ☒ Condition observed ☒ pH verified (where applicable) ☐ Field and lab IDs cross referenced

**ACTION:** If no, contact lab for submission of missing or incomplete documentation.

1.5.1 Were the correct bottles and preservatives used?

Yes ☒ No ☐ N/A ☐ Comments:

☒ Ammonia, - 1 Liter polyethylene/H<sub>2</sub>SO<sub>4</sub> to pH<2, cool to 4°C

Oil & Grease - 1 Liter glass/HCL to pH<2, cool to 4°C

Alkalinity - 1 Liter polyethylene/cool to 4°C

Chemical Oxygen Demand - 50 mL polyethylene/H<sub>2</sub>SO<sub>4</sub> to pH<2, cool to 4°C

☒ Chloride, pH, sulfate - 50 mL polyethylene/cool to 4°C

Organic Carbon - 500 mL amber glass bottle/HCL or H<sub>2</sub>SO<sub>4</sub> to pH<2, cool to 4°C

Sulfide - 50 mL polyethylene/ZnAcetate + NaOH to pH>9, cool to 4°C

Specific conductance, TDS, TSS - 100 mL polyethylene/cool to 4°C

**ACTION:** If no, inform senior chemist. Document justification for change in container/volume (if applicable), qualify positive and non-detect data (J) data if cooler temperature exceeds 10°C. Rejection of data requires professional judgment

Yes ☒ No ☐ N/A ☐ Comments:

1.5.2 Were all samples delivered to the laboratory without breakage?

1.5.3 Does the *Cooler Receipt Form* or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data?

Yes ☐ No ☒ N/A ☐ Comments:



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1.6 Sample Results Section: Was the following information supplied in the laboratory report for each sample?

Yes ☒ No ☐ N/A ☐ Comments:

- ☒ Field ID and Lab ID ☒ Date and time collected ☒ Analyst Initials ☒ Dilution Factor ☒ % moisture or solids ☒ Reporting limits  
☒ Clean-up method ☒ Analysis method ☒ Preparation method ☒ Date of preparation/extraction/digestion clean-up and analysis, where applicable  
☒ Matrix ☒ Target analytes and concentrations ☒ Units (soils must be reported in dry weight)

ACTION: If no, contact lab for submission of missing or incomplete information.

1.7 QA/QC Information: Was the following information provided in the laboratory report Yes ☐ No ☒ N/A ☐ Comments:

- ☒ Method blank results ☒ LCS recoveries ☒ MS/MSD recoveries and RPDs ☒ Laboratory duplicate results (where applicable)

ACTION: If no, contact lab for submission of missing or incomplete information.

2.0 Holding Times Yes ☐ No ☒ N/A ☐ Comments:

Have any technical holding times, determined from date of collection to date of analysis, been exceeded? The holding times are as follows:

- ☒ 28 days = ammonia, chemical oxygen demand, chloride, organic carbon, oil & grease, specific conductance, total organic carbon and sulfate  
 Alkalinity = 14 days Sulfide, TDS, TSS = 7 days pH = analyze immediately ☒ Nitrate nitrogen as N = 48 hrs  
☒ Nitrite nitrogen as N = 48 hrs Nitrate + Nitrite as N = 28 days

NOTE: List samples that exceed hold time with # of days exceeded on checklist

ACTION: If technical holding times are exceeded qualify results (J). For water samples that are grossly exceeded (>2X hold time) reject (R) all non-detect results. Professional judgment used to qualify soils.

3.0 Laboratory Method Yes ☒ No ☐ N/A ☐ Comments:

3.1 Was the correct laboratory method used?

ACTION: If no, contact lab to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change or to request variance.

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3.2 Are the practical quantitation limits the same as those specified by the Yes ☒ No ☐ N/A ☐ Comments:  
☐ SOW ☒ QAPP ☐ Lab?

**Note:** The MADEP QA/QC Guidelines do not yet list PQLs for wet chemistry analyses, therefore all criteria will default to values stipulated in the QAPP\*. Where the QAPP does not define criteria, QA/QC requirements default to limits employed by the lab\*\*. Other criteria may also apply.

Ammonia* <input checked="" type="checkbox"/> = 0.1 mg/L	Alkalinity** <input type="checkbox"/> = 1 mg/L	Bicarbonate Alkalinity** <input type="checkbox"/> = 1 mg/L	Carbonate Alkalinity** <input type="checkbox"/> = 1 mg/L
Nitrate Nitrogen as N* <input checked="" type="checkbox"/> = .05 mg/L	Nitrite Nitrogen as N* <input checked="" type="checkbox"/> = .01 mg/L	Chloride* <input checked="" type="checkbox"/> = 1 mg/L	Hardness* <input type="checkbox"/> = 2 mg/L
Spec. Cond.** <input type="checkbox"/> 3 umhos/cm	Total Organic Carbon** <input type="checkbox"/> = 1 mg/L	Oil & Grease* <input type="checkbox"/> = 3 mg/L	Sulfate (EPA 300.0)* <input checked="" type="checkbox"/> = 2 mg/L
COD:* Low - 20 mg/L	COD* High - 50 mg/L <input type="checkbox"/>	TDS* <input type="checkbox"/> = 10 mg/L	TSS* <input type="checkbox"/> = 5 mg/L
pH* <input type="checkbox"/> < 2 to > 12			
Other parameter(list) _____	PQL = _____ <input type="checkbox"/> Source of PQL = _____		
Other parameter(list) _____	PQL = _____ <input type="checkbox"/> Source of PQL = _____		

**ACTION:** If no, evaluate change with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation.

3.3 Are the appropriate parameter results present for each sample in the SDG? Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data

3.4 If dilutions were required, were dilution factors reported? Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, contact the lab for submission.

4.0 Method Blanks Yes ☒ No ☐ N/A ☐ Comments:

4.1 Are the Method Blank Summaries present?

**ACTION:** If no, call the laboratory for submission of missing data.

4.2 Was a method blank analyzed for each analysis batch of wet chemistry field samples of 20 or less? Yes ☒ No ☐ N/A ☐ Comments:

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**ACTION:** If no, document discrepancy in case narrative and contact lab for justification. Consult senior chemist for action needed.

4.3 Is the method blank less than the PQL? (See Section 3.2 for PQLs). Yes ☒ No ☐ N/A ☐ Comments:

4.4 Do any method blanks have positive results for wet chemistry parameters? Qualify data according to the following: Yes ☐ No ☒ N/A ☐ Comments:

If the sample concentration is  $< 5 \times$  blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is  $> 5 \times$  blank value, no qualification is needed.

**ACTION:** If any blank has positive results, list all the concentrations detected and flagging level (flagging level =  $5 \times$  blank value) on the checklist. List all affected samples and their qualifiers.

**5.0 Laboratory Control Standards**

5.1 Was a laboratory control standard (LCS) run with each analytical batch of 20 samples or less? Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, call laboratory for LCS form submittal. If data is not available, use professional judgment to determine qualification actions for data associated with the batch.

5.2 Is a LCS Summary Form present? Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, contact lab for resubmission of missing data.

5.3 Is any wet chemistry analyte LCS recovery outside the control limits? Yes ☐ No ☒ N/A ☐ Comments:

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LCS Limits:

Alkalinity** <input type="checkbox"/> = 80-120%	Bicarbonate Alkalinity** <input type="checkbox"/> = 80-120%	Carbonate Alkalinity** <input type="checkbox"/> = 80-120%	Specific Conductivity * <input type="checkbox"/> = 80-120%
Total Organic Carbon** <input type="checkbox"/> = 80-120%	TDS** <input type="checkbox"/> = 80-120%	Oil & Grease* <input type="checkbox"/> = 80-120%	Ammonia Nitrogen as N* <input checked="" type="checkbox"/> = 80-120%
COD Low* <input type="checkbox"/> = 80-120%	COD High* <input type="checkbox"/> = 80-120%	Nitrate Nitrogen as N** <input checked="" type="checkbox"/> = 85-115%	Nitrite Nitrogen as N** <input type="checkbox"/> = 75-120%
Hardness* <input type="checkbox"/> = 85-115%	Chloride* <input checked="" type="checkbox"/> = 80-120%	Sulfate (EPA 300.0)* <input type="checkbox"/> = 75-125%	pH* <input type="checkbox"/> = 98-102%      TSS* NA
Other parameter(list) _____ %R = _____		<input type="checkbox"/> Rec Limits = _____	
Other parameter(list) _____ %R = _____		<input type="checkbox"/> Rec Limits = _____	

(MADEP has not yet defined LCS recovery limits for wet chemistry analyses.)

**ACTION:** If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit, qualify all positive and no-detect results within the batch as (J). If LCS recovery is <10%, non-detect results are rejected (R).

**6.0**    Matrix Spikes

Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.

6.1    Were project-specific MS/MSDs analyzed? List project samples that were spiked.

**ACTION:** If no, contact senior chemist to see if any were specified.

Yes ☐    No ☒    N/A ☐    Comments:

6.2    Is the MS/MSD Recovery Form present?

**ACTION:** If no, contact lab for resubmission of missing data.

Yes ☐    No ☐    N/A ☒    Comments:



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6.3 Were matrix spikes analyzed at the required frequency of 1 per 20 samples per matrix? Yes ☐ No ☐ N/A ☒ Comments:

**ACTION:** If any matrix spike data is missing, call lab for resubmission.

6.4 Are any wet chemistry analyte spike recoveries outside of the QC limits?

Yes ☐ No ☐ N/A ☒ Comments:

NOTE:  $\%R = \frac{(SSR-SR)}{SA} \times 100\%$

Where: SSR = Spiked sample result  
 SR = Sample result

SA = Spike added

**MS/MSD Recovery Limits:**

Alkalinity* = NA	Bicarbonate Alkalinity* = NA	Carbonate alkalinity* = NA	Ammonia* (LACHAT) <input type="checkbox"/> = 74-125%
Chloride*(SM 4500 Cl) <input type="checkbox"/> = 77-116%	Specific Conductivity* = NA	Total Organic Carbon* = NA	TDS** = NA
Oil & Grease* = NA	COD Low* <input type="checkbox"/> = 61-142%	COD High* <input type="checkbox"/> = 92-109%	Nitrate Nitrogen as N** <input type="checkbox"/> = 75-119%
Nitrite Nitrogen as N** <input type="checkbox"/> = 68-136%	Hardness* <input type="checkbox"/> = 70-130%	Sulfate (EPA 300.0)* <input type="checkbox"/> = 75-125%	pH* = NA TSS* = NA
Other parameter(list)	% R =	<input type="checkbox"/> Rec Limits =	

\* = Laboratory Limits

\*\* = Olin QAPP Limits (MADEP has not yet defined LCS recovery limits for wet chemistry analyses.)

**NOTES:** 1) If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags.  
 2) If the MS/MSD was performed by the laboratory on a non-project sample, no qualification is required.

**ACTION:** MS/MSD flags only apply to the sample spiked. Do not evaluate if sample concentration is > 4X spike. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit but > 30%, qualify both positive results and non-detects (J). If the MS/MSD recovery is < 30% and the sample is non-detect, the results are considered unusable and flagged (R).

**ACTION:** Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample concentrations, the data is evaluated, but no flags are applied.

6.5 Are any RPDs for MS/MSD recoveries outside of the QA/QC limits?

NOTE:  $RPD = \frac{S-D}{(S+D)/2} \times 100\%$  Where S = MS result  
 D = MSD result

Yes ☐ No ☐ N/A ☒ Comments:



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MS/MSD RPD Limits:

Alkalinity* = NA	Bicarbonate Alkalinity* = NA	Carbonate alkalinity* = NA	Ammonia** (LACHAT) <input type="checkbox"/> = 8%
Chloride**(SM 4500 Cl) <input type="checkbox"/> = 15%	Specific Conductivity * = NA	Total Organic Carbon* = NA	TDS** = NA Total Organic Carbon* = NA
COD Low** <input type="checkbox"/> = 14%	COD High** <input type="checkbox"/> = 16%	Nitrate Nitrogen as N** <input type="checkbox"/> 16%	Nitrite Nitrogen as N** <input type="checkbox"/> = 16%
Oil & Grease* = NA	Hardness* = NA	Sulfate (EPA 300.0)* <input type="checkbox"/> = 10%	pH* = NA TSS* = NA
Other parameter(list) _____	RPD = _____	<input type="checkbox"/> RPD limit = _____	
Other parameter(list) _____	RPD = _____	<input type="checkbox"/> RPD limit = _____	

\* = Laboratory Limits      \*\* = Olin QAPP Limits

(MADEP has not yet defined LCS recovery limits for wet chemistry analyses.)

**7.0** Laboratory Duplicate

Are the RPDs for the laboratory duplicates <20% unless otherwise specified below?

Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If the RPD is greater than specified limits, qualify all results for that analyte as estimated (J).

Alkalinity* = 4%	Bicarbonate Alkalinity* = 4%	Carbonate alkalinity* = 4%	Oil & Grease* <input type="checkbox"/> = 20%
pH* <input type="checkbox"/> = 3%	Specific Conductivity * <input type="checkbox"/> = 5%	TSS** <input type="checkbox"/> = 6%	TDS** <input type="checkbox"/> = 6%

**8.0** Sampling Accuracy

The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.

8.1 Were rinse blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples from the senior chemist.

Yes ☐ No ☒ N/A ☐ Comments:

8.2 Do any rinsate blanks have positive results?

Yes ☐ No ☐ N/A ☒ Comments:

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**ACTION:** Evaluate rinsate results vs. blank results to determine if contaminant may be laboratory-derived. If not lab-related, qualify according to the table below.

If the sample concentration is  $< 5 \times$  blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is  $> 5 \times$  blank value, no qualification is needed.

**NOTE:** MADEP does not require the collection of rinsate blanks.

**9.0**    Field Duplicates

9.1    Were field duplicate samples collected? Obtain a list of samples and their associated field duplicates.    Yes ☐    No ☒    N/A ☐    Comments:

9.2    Were field duplicates collected per the required frequency?    Yes ☐    No ☐    N/A ☒    Comments:

SOW ☐ QAPP ☐ MADEP Option 1(1 per 20) ☐ MADEP Option 3 (1 per 10) ☐    9.3    Was the RPD  $\leq 50\%$  for soils or waters? Calculate the RPD for all results and attach to this review.    Yes ☐    No ☐    N/A ☒    Comments:

**ACTION:** RPD must be  $\leq 50\%$  for soil and water. Qualify data (J) for both sample results if the RPD exceeds 50%.

Was any of the data qualified?    Yes ☐    No ☒    N/A ☐    Comments:

If so, apply data qualifiers directly to the DQE copy of laboratory report and flag pages for entry in database.

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REFERENCES

LAW, 1999, "Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999.

STL-Westfield, 2002. "Olin - General Chemistry Control Limits (Soil & Water)." Severn Trent Laboratories, Inc., 53 Southampton Road, Westfield, MA, 01085.

## LEVEL I DATA QUALITY EVALUATION

## STANDARD OPERATING PROCEDURE AND CHECKLIST

ICP METALS BY METHOD 6010B/200.7

Reviewer/Date W. J. B. Williams 6/30/02  
 Sr. Review/Date Chm. Reimold 7/26/02  
 Lab Report # 225138, 225228, 225043, 225191  
 Project # 630030008, 23.02

calcium, iron, magnesium, sodium, dissolved aluminum, dissolved chromium

1.0 Laboratory Deliverable Requirements

1.1 Laboratory Information: Was all of the following provided in the laboratory report? Yes ☒ No ☐ N/A ☐ Comments:  
 Check items received.

☒ Name of Laboratory ☒ Address ☒ Project ID ☒ Phone # ☒ Sample identification - Field and Laboratory  
 Client Information: ☒ Name ☒ Address ☒ Client Contact (IDs must be cross-referenced)

ACTION: If no, contact lab for submission of missing or illegible information.

## 1.2 Laboratory Report Certification Statement

Yes ☒ No ☐ N/A ☐ Comments:

Does the laboratory report include a completed Analytical Report Certification in the required format?

ACTION: If no, contact lab for submission of missing certification or certification with correct format.

## 1.3 Laboratory Case Narrative:

Yes ☒ No ☐ N/A ☐ Comments:

☒ Narrative serves as an exception report for the project and method QA/QC performance. ☒ Narrative includes an explanation of each discrepancy on the

Certification Statement.

ACTION: If no, contact lab for submission of missing or illegible information.

1.4 Chain of Custody (COC) copy present with all documentation completed

Yes ☒ No ☐ N/A ☐ Comments:

NOTE: Olin receives and maintains the original COC.

ACTION: If no, contact lab for submission of copy of completed COC.



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1.5 Sample Receipt Information (Cooler Receipt Form present?):

Yes ☒ No ☐ N/A ☐ Comments:

Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory?

☒ Sample temperature confirmed: must be 1° - 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply).

☒ Container type noted ☒ sample condition observed ☒ pH verified (where applicable) ☒ Field and lab IDs cross referenced

ACTION: If no, contact lab for submission of missing or incomplete documentation.

1.5.1 Were all samples delivered to the laboratory without breakage?

Yes ☒ No ☐ N/A ☐ Comments:

1.5.2 Does the Cooler Receipt Form or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data?

Yes ☐ No ☒ N/A ☐ Comments:

1.6 Sample Results Section: Was each of the following requirements supplied in the laboratory report for each sample?

Yes ☒ No ☐ N/A ☐ Comments:

☒ Field ID and Lab ID  
☒ Clean-up method  
☒ Matrix

☒ Date and time collected  
☒ Analysis method  
☒ Target analytes and concentrations

☒ Analyst Initials  
☒ Preparation method

☒ Dilution Factor  
☒ Date of preparation/extraction/digestion clean-up and analysis, where applicable  
☒ Units (soils must be reported in dry weight)

☒ % moisture or solids

☒ Reporting limits

ACTION: If no, contact lab for submission of missing or incomplete information.

1.7 QA/QC Information: Was each of the following information supplied in the laboratory report for each sample batch?

Yes ☒ No ☐ N/A ☐ Comments:

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☒ Method blank results    ☒ LCS recoveries    ☒ MS/MSD recoveries and RPDs    ☒ Laboratory duplicate results (where applicable)

ACTION: If no, contact lab for submission of missing or incomplete information.

2.0 Holding Times

Have any technical holding times, determined from date of collection to date of analysis, been exceeded? Holding time for metals is 180 days from sample collection to analysis for both water and soil.

Yes ☐    No ☒    N/A ☐    Comments:

NOTE: List samples that exceed hold time with # of days exceeded on checklist

ACTION: If technical holding times are exceeded, qualify all positive results (J) and non-detects (UJ). If grossly exceeded (2X holding time) reject (R) all non-detect results.

3.0 Laboratory Method

3.1 Was the correct laboratory method used?

Yes ☒    No ☐    N/A ☐    Comments:

Water Digestion    3005A or 3010A or 3020A  
Soil Digestion    3050B  
Metals    6010B or 200.7

ACTION: If no, contact laboratory to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change and to request variance.

3.2 Are the practical quantitation limits the same as those specified by the

Yes ☐    No ☒    N/A ☐    Comments: The lab reported a PQL for chromium (5 ug/L) that is less than the QAPP required PQL of 10 ug/L. No further action required. The lab reported a PQL for sodium (1000 ug/L) that is greater than the QAPP PQL of 1000 ug/L. Sodium results are 3 of 10 greater than the PQL. No further action required.

NOTE: Verify that the reported metals match the target list specified on the COC.

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ACTION: If no, evaluate variation with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation.

3.3 Are results present for each sample in the SDG? Yes ☒ No ☐ N/A ☐ Comments:

ACTION: If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data

3.4 If dilutions were required, were dilution factors reported? Yes ☒ No ☐ N/A ☐ Comments:

ACTION: If no, contact the lab for submission.

4.0 Method Blanks

4.1 Is the Method Blank Summary present? Yes ☒ No ☐ N/A ☐ Comments:

ACTION: If no, call the laboratory for submission of missing data.

4.2 Frequency of Analysis: Was a method blank analyzed for each digestion batch of < 20 field samples? Yes ☒ No ☐ N/A ☐ Comments:

ACTION: If no, contact laboratory for justification. Consult senior chemist for action needed. Narrate non-compliance.

4.3 Is the method blank less than the PQLs for all target elements? Yes ☐ No ☒ N/A ☐ Comments:

NOTE: MADEP requires the method blank to be matrix matched and digested with the samples

4.4 Do any method blanks have positive results for metals? Qualify data according to the following: Yes ☒ No ☐ N/A ☐ Comments: Chromium is reported in the method blank associated with samples MP3 Port 19, MP3 Port 13, MP3 Port 7, MP3 Port 15, MP3 Port 4, MP3 Port 3 and MP3 Port 1 (225191-1 thru 7). An action limit was established at five times the chromium concentration (11.23 ug/L, AL=56.2 ug/L). The result for chromium in samples MP3 Port 19, Port 13 and Port 7 (225191-1, -2 and -3) are non-detected and require no further action. The result for MP3 Port 4 is < 1.1 ug/L, which is less than the action limit. No further action required.



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If the sample concentration is  $< 5 \times$  blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is  $> 5 \times$  blank value, no qualification is needed.

**ACTION:** For any blank with positive results, list all contaminants for each method blank including the concentration detected and the flagging level (flagging level =  $5 \times$  the blank value) and the associated samples and qualifiers.

**5.0 Laboratory Control Standard**

**5.1** Was a laboratory control standard run with each analytical batch of 20 samples or less? Yes ☒ No ☐ N/A ☐ Comments:

**NOTE:** A full target, second source LCS is required by MADEP.

**ACTION:** Call laboratory for LCS form submittal. If data are not available, use professional judgement to evaluate data accuracy associated with that batch.

**5.2** Is a LCS Summary Form present? Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, contact lab for resubmission of missing data.

**5.3** Is the recovery of any analyte outside of MADEP control limits? Yes ☐ No ☒ N/A ☐ Comments:

Sample Type MADEP  
Water 80-120  
Soil within Lab generated limits

**ACTION:** If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit, qualify all positive and non-detects results within the batch as (J). If LCS recovery is  $< 30\%$ , positive and non-detect results are rejected (R).

Comments:



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6.0 Matrix Spikes

Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.

- 6.1 Were project-specific MS/MSDs collected? *analyzed?* List project samples that were spiked. *6/30/05* Yes ☒ No ☐ N/A ☐ Comments: *The lab performed MS/MSD analysis on sample MP4 Port 13 (225191-1) and MP3 Port 1 (225191-1).*

ACTION: If no, contact senior chemist to see if any were specified.

- 6.2 Is the Matrix Spike/Matrix Spike Duplicate Recovery Form present? Yes ☒ No ☐ N/A ☐ Comments:

NOTE: A full target, second source MS/MSD is required by MADEP.

ACTION: If any matrix spike data are missing, call lab for resubmission.

- 6.3 Were matrix spikes analyzed as indicated on the COC and project schedule? Yes ☒ No ☐ N/A ☐ Comments:

ACTION: If any matrix spike data are missing, call lab for resubmission. If none, no qualification is needed. Narrate non-compliance.

- 6.4 Are any metal spike recoveries outside of the QC limits?

Sample Type	MADEP % Rec 75-125	QAPP % Rec	Method
Water		N/A	6010B
Water	N/A	70-130	200.7
Soil	75-125	75-125	6010B

NOTE:  $\%R = \frac{(SSR-SR)}{SA} \times 100\%$

Where: SSR = Spiked sample result  
SR = Sample result  
SA = Spike added

Yes ☒ No ☐ N/A ☐ Comments: *The MS and MSD percent recoveries for sodium (54 and 58) in the spike analysis of sample MP3 Port 19 (225191-1) are less than the lower QC control limit of 75. The unspiked sample concentration is greater than four times the spiked concentration. No further action required.*  
*The MS percent recovery for chromium (70) is less than the lower QC control limit of 75. The MSD percent recovery and the RPD are in criteria. No further action required.*

NOTE: If dilutions are required due to high sample concentrations (> 4X spike), the data are evaluated, but no flags are applied.

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**NOTE:** If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags.

**ACTION:** MS/MSD flags only apply to the sample spiked. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit, qualify positive results and non-detects (J).

6.5 Are any RPDs for MS/MSD recoveries outside of the QC limits? Yes ☐ No ☒ N/A ☐ Comments:

**NOTE:**  $RPD = \frac{S-D}{(S+D)/2} \times 100\%$  Where: S = MS sample result  
D = MSD sample result

**NOTE:** If dilutions are required due to high sample concentrations, the data are evaluated, but no flags are applied.

**ACTION:** If the RPD exceeds the control limit, qualify positive results and non-detects (J).

7.0 Laboratory Duplicate

7.1 Was a laboratory duplicate sample analyzed? If so, is the Laboratory Duplicate Sample Form present? Yes ☐ No ☒ N/A ☐ Comments:

**NOTE:** MADEP refers to this sample as a "matrix duplicate".

**ACTION:** If not analyzed, qualification is not needed. If data is missing, contact laboratory for resubmission of report. Narrate non-compliance.

7.2 Is the RPD between the result for the laboratory duplicate sample and the result for the parent sample outside of the QA/QC limits? Yes ☐ No ☐ N/A ☒ Comments:

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MADEP Laboratory Duplicate Sample RPD Criteria:

For aqueous results  $> 5 \times RL$ , RPD must be  $\pm 20\%$

For aqueous results  $< 5 \times RL$ , RPD must be  $\leq RL$

For soil/sediment results  $> 5 \times RL$ , RPD must be  $\pm 35\%$

For soil/sediment results  $< 5 \times RL$ , RPD must be  $\leq 2 \times RL$

QAPP RPD

20

20

20

20

**ACTION:** If the RPD exceeds the limits, qualify both positive results and non-detects as estimated and flag them J. Narrate non-compliance

**8.0** Sampling Accuracy

The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.

8.1 Were rinse blanks collected? Prior to evaluating rinse blanks, obtain a list of the associated samples from the senior chemist.

Yes ☐

No ☒

N/A ☐

Comments:

8.2 Do any rinse blanks have positive results?

Yes ☐

No ☐

N/A ☒

Comments:

**NOTE:** MADEP does not require the collection of rinse blanks.

**ACTION:** Evaluate rinse results against blank results to determine if contaminant may be laboratory-derived. If results are not lab-related, qualify according to below.

If the sample concentration is  $< 5 \times$  blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is  $> 5 \times$  blank value, no qualification is needed.

**9.0** Field Duplicates

9.1 Were field duplicate samples collected? Obtain a list of samples and their associated field duplicates.

Yes ☐

No ☒

N/A ☐

Comments:

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9.2 Were field duplicates collected per the required frequency?

Yes ☐ No ☐ N/A ☒ Comments:

SOW ☐ QAPP (1 per 10) ☐ MADEP Option 1 (1 per 20) ☐ MADEP Option 3 (1 per 10) ☐

9.3 Was the RPD  $\leq 50\%$  for soils or waters? Calculate the RPD for all results and attach to this review. Yes ☐ No ☐ N/A ☒ Comments:

ACTION: RPD must be  $\leq 50\%$  for soil and water. Qualify data (J) for both sample results if the RPD exceeds 50%.

10.0 Special QA/QC

10.1 Were both total and dissolved metals analysis performed? If so, the dissolved metal concentration should not exceed that of the total metal. Yes ☐ No ☒ N/A ☐ Comments:

ACTION: If results for both total and dissolved are  $\geq 5x$  the PQL and the dissolved concentration is 10% higher than the total, flag both results as estimated (J). If total and dissolved concentrations are less than 5x the PQL and the difference exceeds 2x the PQL, flag both results as estimated (J)



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10.0 Application of Validation Qualifiers

Was any of the data qualified?

Yes ☐ No ☒ N/A ☐ Comments:

If so, apply data qualifiers directly to the DQE copy of laboratory report and flag pages for entry in database.

**REFERENCES**

- LAW, 1999, "Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999
- U.S. Environmental Protection Agency (USEPA), 1989. "Region 1 Laboratory Data Validation Functional Guidelines For Evaluating Inorganic Analyses"; Hazardous Site Evaluation Division; February 1989.
- MADEP, 2001. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Massachusetts Quality Assurance and Quality Control (QA/QC) Requirements." BWSC-CAM, Interim Final Draft, Revision No. 2, 5 October 2001.
- MADEP, 2001. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for Sampling, Data Evaluation and Reporting Activities," BWSC-CAM, Section VII, Public Comment Draft, Revision No. 0, 21 December 2001.

The first part of the paper discusses the importance of understanding the cultural context of the research. It highlights the need for researchers to be sensitive to the values and beliefs of the communities they are studying. This is particularly important in the field of education, where cultural differences can significantly impact learning outcomes. The paper then moves on to discuss the challenges of conducting research in diverse cultural settings. It notes that researchers often face difficulties in establishing rapport with participants and in interpreting their responses. To address these challenges, the paper suggests several strategies, including the use of local researchers and the development of culturally appropriate research instruments. The final part of the paper discusses the importance of ethical considerations in cross-cultural research. It emphasizes the need for researchers to obtain informed consent from participants and to ensure that the research is conducted in a way that respects the dignity and rights of all individuals involved.

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05/16/2005

Report Number: 225093

MP-2 (1 of 2)

Dear Steve Morrow,

The analysis of your sample(s) submitted on 05/02/2005 is now complete and the appropriate analytical report is enclosed. The samples were prepared and analyzed according to established methodologies and protocols. All holding times were met for the methods performed on these samples, unless otherwise noted in the report's case narrative.

If you have any questions regarding this report, please contact your Project Manager, Rebecca C. Mason.

For questions, concerns or comments regarding our service, please do not hesitate to contact me directly. Thank you for selecting STL Westfield, and we look forward to working with you on future projects.

Steven C. Hartmann  
Laboratory Director  
STL WESTFIELD

Technical Review: 5/17/05

Total number of pages in this report: 46



# MADEP MCP Analytical Method Report Certification Form

Laboratory Name: **Severn Trent Laboratory (STL) Westfield** Project #: **225093**

Project Location: **MADEP RTN<sup>1</sup>:**

This form provides certifications for the following data set:[list Laboratory Sample ID Number(s)]  
225093-1-4

Sample Matrices:	Groundwater	Soil/Sediment	Drinking Water	Other:
<b>MCP SW-846</b>	8260B ( )	8151A ( )	8330 ( )	6010B ( <b>x</b> ) 7470A/1A ( ) Other ( )
<b>Methods Used</b>	8270C ( )	8081A ( )	VPH ( )	6020 ( ) 9014M <sup>2</sup> ( )
As specified in MADEP Compendium of Analytical Methods. (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S <sup>3</sup> ( ) 7196A ( )
	1 List Release Tracking Number (RTN), if known 2 M - SW-846 Method 9014 or MADEP Physiologically Available Cyanide (PAC) Method 3 S - SW-846 Methods 7000 Series List individual method and analyte.			

**An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status**

<b>A</b>	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	<input checked="" type="radio"/> Yes No <sup>1</sup>
<b>B</b>	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	<input checked="" type="radio"/> Yes No <sup>1</sup>
<b>C</b>	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in Section 2.0 (a), (b), (c) and (d) of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	<input checked="" type="radio"/> Yes N/A No <sup>1</sup>
<b>D</b>	<b>VPH and EPH methods only:</b> Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods)?	Yes <input checked="" type="radio"/> N/A No <sup>1</sup>

**A response to questions E and F below is required for "Presumptive Certainty" status**

<b>E</b>	Were all QC performance standards and recommendations for the specified methods achieved?	<input checked="" type="radio"/> Yes No <sup>1</sup>
<b>F</b>	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes N/A <input checked="" type="radio"/> No

<sup>1</sup> All Negative responses must be addressed in an attached Environmental Laboratory case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: *Steven C. Hartmann*

Position: Laboratory Director

Printed Name: Steven C. Hartmann

Date: 5/17/05

CAM VII A, Rev 3.2

April-04

**SEVERN  
TRENT** **STL**

MADEP MA014  
NY DOH 10843  
RI DOH 57  
CT DPH 0494  
VT DECWSD

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NH DES 253901-A



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148 Rungeway Rd  
N. Billerica, MA 01862  
Tel: (978) 667-1400  
Fax: (978) 667-7871



# MADEP MCP Analytical Method Report Certification Form

Laboratory Name: **Severn Trent Laboratory (STL) Westfield** Project #: **225093**

Project Location: **MADEP RTN<sup>1</sup>:**

This form provides certifications for the following data set:[list Laboratory Sample ID Number(s)]  
225093-1-4

Sample Matrices:	Groundwater	Soil/Sediment	Drinking Water	Other:
<b>MCP SW-846</b>	8260B ( )	8151A ( )	8330 ( )	6010B ( ) 7470A/1A ( ) Other ( x )
<b>Methods Used</b>	8270C ( )	8081A ( )	VPH ( )	6020 ( ) 9014M <sup>2</sup> ( )
As specified in MADEP Compendium of Analytical Methods. (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S <sup>3</sup> ( ) 7196A ( )
	1 List Release Tracking Number (RTN), if known 2 M - SW-846 Method 9014 or MADEP Physiologically Available Cyanide (PAC) Method 3 S - SW-846 Methods 7000 Series List individual method and analyte.			

**An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status**

<b>A</b>	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	<input checked="" type="radio"/> Yes <input type="radio"/> No <sup>1</sup>
<b>B</b>	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	<input checked="" type="radio"/> Yes <input type="radio"/> No <sup>1</sup>
<b>C</b>	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in Section 2.0 (a), (b), (c) and (d) of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes <input checked="" type="radio"/> N/A <input type="radio"/> No <sup>1</sup>
<b>D</b>	<b>VPH and EPH methods only:</b> Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods)?	Yes <input checked="" type="radio"/> N/A <input type="radio"/> No <sup>1</sup>

**A response to questions E and F below is required for "Presumptive Certainty" status**

<b>E</b>	Were all QC performance standards and recommendations for the specified methods achieved?	<input checked="" type="radio"/> Yes <input type="radio"/> No <sup>1</sup>
<b>F</b>	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes <input checked="" type="radio"/> N/A <input type="radio"/> No <sup>1</sup>

<sup>1</sup> All Negative responses must be addressed in an attached Environmental Laboratory case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: *Steven C. Hartmann*

Position: Laboratory Director

Printed Name: Steven C. Hartmann

Date: 5/17/05

CAM VII A, Rev 3.2

April-04

**SEVERN  
TRENT** **STL**

MADEP MA014  
NY DOH 10843  
RI DOH 57  
CT DPH 0494  
VT DECWSD  
NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NH DES 253901-A



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Fax:(413)572-3707

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N.Billerica, MA 01862  
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Fax:(978)667-7871

## MCP CASE NARRATIVE

**Client: Olin Chemical**

**Report Number: 225093**

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues as stipulated in the MCP reporting requirements.

In order to facilitate report review, a separate MCP Analytical Method Report Certification Form is included for each method requested.

It should be noted that samples with elevated Reporting Limits (RLs) as a result of a dilution may not be able to satisfy "MCP program" reporting limits in some cases if the "adjusted" RL is greater than the applicable MCP standards or criterion to which the concentration is being compared. Such increases in the RLs are unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes, which exceed the calibration range.

Calculations are performed before rounding to avoid round-off errors in calculated results. All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

The project samples were received on 05/02/05; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt at the laboratory was 6.7°C.

\* Note: All samples which require thermal preservation are considered acceptable by STL Westfield if the arrival temperature is within  $\pm 2^{\circ}\text{C}$  of the required temperature. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

It is a recognized common industry practice that a sample transported to and received at a laboratory, packed on ice (or blue ice), has maintained its thermal preservation integrity during transfer. It can be argued, with constant warming of the cooler, the samples were maintained at proper temperature for a majority of time spent in transportation. Based on this and the fact that the samples were packed with ice, it is the laboratory's opinion these samples were not compromised.

### Subcontract

Specific Gravity by ASTM D70 was performed by STL Houston 6310 Rothway Drive Houston, TX 77040.

### SW846 6010B

All QA/QC procedures required for the specified analytical method were performed as per section B of the MADEP MCP analytical method report Certification form.

All QC performance standards and recommendations for this specific method were achieved.



General method information:

At the request of the client, an abbreviated/modified MCP analyte list was reported for this job.

**The following reported method is not listed in the MADEP Massachusetts Contingency Plan (MCP) Compendium of Analytical Methods (CAM), pursuant to the provisions of 310 CMR 40.0017(2).**

**LAC 10-107061B**

All QC performance standards and recommendations for this specific method were achieved.

General method information:

Due to high target compounds the following sample(s) were analyzed at a dilution: 225093-3 (20x) and 225093-4 (1000x).

**EPA 300.0 (Nitrate)**

All QC performance standards and recommendations for this specific method were achieved.

**EPA 300.0 (Nitrite)**

All QC performance standards and recommendations for this specific method were achieved.

**EPA 300.0 (Chloride)**

All QC performance standards and recommendations for this specific method were achieved.

General method information:

Due to high target compounds the following sample(s) were analyzed at a dilution: 225093-3 (10x). 225093-4 (100x).

**EPA 300.0 (Sulfate)**

All QC performance standards and recommendations for this specific method were achieved.

General method information:

Due to high target compounds the following sample(s) were analyzed at a dilution: 225093-1 & 3 (10x), 225093-4 (100x).

S A M P L E   I N F O R M A T I O N

Date: 05/16/2005

Job Number.: 225093  
Customer...: Olin Chemical  
Attn.....: Steve Morrow

Project Number.....: 20000348  
Customer Project ID....: C033038  
Project Description....: Geomega Column Testing

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
225093-1	MP-2 Port 15	Water	05/02/2005	12:13	05/02/2005	18:50
225093-2	MP-2 Port 11	Water	05/02/2005	13:57	05/02/2005	18:50
225093-3	MP-2 Port 10	Water	05/02/2005	14:24	05/02/2005	18:50
225093-4	MP-2 Port 9	Water	05/02/2005	14:48	05/02/2005	18:50

# LABORATORY TEST RESULTS

Job Number: 225093

Date: 05/16/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-2 Port 15  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 12:13  
Sample Matrix.....: Water

Laboratory Sample ID: 225093-1  
Date Received.....: 05/02/2005  
Time Received.....: 18:50

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	87		10	mg/L	05/03/05	rwe
EPA300.0 PartA	Sulfate	22		2.0	mg/L	05/03/05	rwe
EPA300.0 PartA	Nitrate as N (NO3-N)	ND	U	0.050	mg/L	05/03/05	rwe
EPA300.0 PartA	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/03/05	rwe
LAC 10-107061B	Ammonia (NH3), as N	2.4		0.10	mg/L	05/05/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	11000		200	ug/L	05/04/05	bpg
	Iron (Fe), Diss.	2100		50	ug/L	05/04/05	bpg
	Magnesium (Mg), Diss.	1200		200	ug/L	05/04/05	bpg
	Sodium (Na), Diss.	48000		2000	ug/L	05/04/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	260		100	ug/L	05/04/05	bpg
	Chromium (Cr), Diss.	23		5.0	ug/L	05/04/05	bpg

\* In Description = Dry Wgt.

Page 2



STL

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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STL Billerica-Service Center  
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N. Billerica, MA 01862  
Tel: (978) 667-1400  
Fax: (978) 667-7871

**LABORATORY TEST RESULTS**

Job Number: 225093

Date: 05/16/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-2 Port 11  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 13:57  
Sample Matrix.....: Water

Laboratory Sample ID: 225093-2  
Date Received.....: 05/02/2005  
Time Received.....: 18:50

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	34		1.0	mg/L	05/03/05	rwe
EPA300.0 PartA	Sulfate	34		2.0	mg/L	05/03/05	rwe
EPA300.0 PartA	Nitrate as N (NO3-N)	ND	U	0.050	mg/L	05/03/05	rwe
EPA300.0 PartA	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/03/05	rwe
LAC 10-107061B	Ammonia (NH3), as N	1.2		0.10	mg/L	05/05/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	7500		200	ug/L	05/04/05	bpg
	Iron (Fe), Diss.	1200		50	ug/L	05/04/05	bpg
	Magnesium (Mg), Diss.	940		200	ug/L	05/04/05	bpg
	Sodium (Na), Diss.	19000		2000	ug/L	05/04/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	140		100	ug/L	05/04/05	bpg
	Chromium (Cr), Diss.	41		5.0	ug/L	05/04/05	bpg

\* In Description = Dry Wgt.

Page 3



**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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**LABORATORY TEST RESULTS**

Job Number: 225093

Date: 05/16/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-2 Port 10  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 14:24  
Sample Matrix.....: Water

Laboratory Sample ID: 225093-3  
Date Received.....: 05/02/2005  
Time Received.....: 18:50

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	260		10	mg/L	05/03/05	rwe
EPA300.0 PartA	Sulfate	790		20	mg/L	05/03/05	rwe
EPA300.0 PartA	Nitrate as N (NO3-N)	ND	U	0.050	mg/L	05/03/05	rwe
EPA300.0 PartA	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/03/05	rwe
LAC 10-107061B	Ammonia (NH3), as N	75		2.0	mg/L	05/05/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	24000		200	ug/L	05/04/05	bpg
	Iron (Fe), Diss.	10000		50	ug/L	05/04/05	bpg
	Magnesium (Mg), Diss.	6700		200	ug/L	05/04/05	bpg
	Sodium (Na), Diss.	140000		2000	ug/L	05/04/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	470		100	ug/L	05/04/05	bpg
	Chromium (Cr), Diss.	230		5.0	ug/L	05/04/05	bpg

\* In Description = Dry Wgt.

Page 4



**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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N. Billerica, MA 01862  
Tel: (978) 667-1400  
Fax: (978) 667-7871

LABORATORY TEST RESULTS

Job Number: 225093

Date: 05/16/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-2 Port 9  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 14:48  
Sample Matrix.....: Water

Laboratory Sample ID: 225093-4  
Date Received.....: 05/02/2005  
Time Received.....: 18:50

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	720		100	mg/L	05/04/05	rwe
EPA300.0 PartA	Sulfate	3300		200	mg/L	05/04/05	rwe
EPA300.0 PartA	Nitrate as N (NO3-N)	ND	U	0.050	mg/L	05/03/05	rwe
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	4900		100	mg/L	05/05/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	130000		400	ug/L	05/05/05	bpg
	Iron (Fe), Diss.	87000		100	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	49000		400	ug/L	05/05/05	bpg
	Sodium (Na), Diss.	810000		4000	ug/L	05/05/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	34000		200	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	7300		10	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

Page 5



**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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Fax: (978) 667-7871



LABORATORY CHRONICLE

Job Number: 225093

Date: 05/16/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Lab ID: 225093-1	Client ID: MP-2 Port 15	Date Recvd: 05/02/2005	Sample Date: 05/02/2005		
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT # (S)	DATE/TIME ANALYZED
LAC 10-107061B	Ammonia	1	43522		05/05/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	43395		05/03/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	43395		05/03/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	43388		05/03/2005 1625
SW846 6010B	Metals Analysis (ICP)	1	43468	43275	05/04/2005 1557
SW846 6010B	Metals Analysis (ICP)	1	43557	43275	05/04/2005 1557
SW846 6010B	Metals Analysis (ICP)	1	43464	43275	05/04/2005 2152
Lab ID: 225093-2	Client ID: MP-2 Port 11	Date Recvd: 05/02/2005	Sample Date: 05/02/2005		
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT # (S)	DATE/TIME ANALYZED
LAC 10-107061B	Ammonia	1	43522		05/05/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	43395		05/03/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	43388		05/03/2005 1659
SW846 6010B	Metals Analysis (ICP)	1	43468	43275	05/04/2005 1600
SW846 6010B	Metals Analysis (ICP)	1	43557	43275	05/04/2005 1600
SW846 6010B	Metals Analysis (ICP)	1	43464	43275	05/04/2005 2159
Lab ID: 225093-3	Client ID: MP-2 Port 10	Date Recvd: 05/02/2005	Sample Date: 05/02/2005		
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT # (S)	DATE/TIME ANALYZED
LAC 10-107061B	Ammonia	1	43522		05/05/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	43396		05/03/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	43393		05/03/2005 1858
SW846 6010B	Metals Analysis (ICP)	1	43468	43275	05/04/2005 1604
SW846 6010B	Metals Analysis (ICP)	1	43557	43275	05/04/2005 1604
SW846 6010B	Metals Analysis (ICP)	1	43464	43275	05/04/2005 2206
Lab ID: 225093-4	Client ID: MP-2 Port 9	Date Recvd: 05/02/2005	Sample Date: 05/02/2005		
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT # (S)	DATE/TIME ANALYZED
LAC 10-107061B	Ammonia	1	43522		05/05/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	43393		05/03/2005 1932
EPA300.0 PartA	Ion Chromatography Analysis	1	43480		05/04/2005 0000
SW846 6010B	Metals Analysis (ICP)	1	43554	43275	05/05/2005 1243
SW846 6010B	Metals Analysis (ICP)	1	43566	43275	05/05/2005 1741
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43443		05/04/2005 1142

# **SUBCONTRACTED DATA**

## ANALYTICAL REPORT

JOB NUMBER: 294993

Project ID: 225093

Prepared For:

STL Westfield  
53 Southampton Road  
Westfield, MA 01085

Attention: Rebecca Mason

Date: 05/06/2005

  
Signature

Name: Sean V. Sundquist

Title: Project Manager III

E-Mail: ssundquist@stl-inc.com

  
Date

Severn Trent Laboratories  
6310 Rothway Drive  
Houston, TX 77040

PHONE: 713-690-4444

TOTAL NO. OF PAGES 15

05/06/2005

Rebecca Mason  
STL Westfield  
53 Southampton Road  
Westfield, MA 01085

Reference:

Project : Specific Gravity  
Project No. : 294993  
Date Received : 05/04/2005  
STL Job : 294993

Dear Rebecca Mason:

Enclosed are the analytical results for your project referenced above. The following samples are included in the report.

1. MP-2 PORT 15
2. MP-2 PORT 11
3. MP-2 PORT 10
4. MP-2 PORT 9

All holding times were met for the tests performed on these samples.

Enclosed, please find the Quality Control Summary. All quality control results for the QC batch that are applicable to the sample(s) are acceptable except as noted in the QC batch reports.

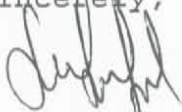
The test results in this report meet all NELAP requirements for STL Houston's NELAP accredited parameters. Any exceptions to NELAP requirements will be noted and included in a case narrative as a part of this report.

If the report is acceptable, please approve the enclosed invoice and forward it for payment.

Thank you for selecting Severn-Trent Laboratories to serve as your analytical laboratory on this project. If you have any questions concerning these results, please feel free to contact me at any time.

We look forward to working with you on future projects.

Sincerely,



Sean V. Sundquist  
Project Manager



SAMPLE INFORMATION  
Date: 05/06/2005

Job Number.: 294993  
Customer...: STL Westfield  
Attn.....: Rebecca Mason

Project Number.....: 99005907  
Customer Project ID...: 225093  
Project Description....: Specific Gravity

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
294993-1	MP-2 PORT 15	Water	05/02/2005	12:13	05/04/2005	08:29
294993-2	MP-2 PORT 11	Water	05/02/2005	13:57	05/04/2005	08:29
294993-3	MP-2 PORT 10	Water	05/02/2005	14:24	05/04/2005	08:29
294993-4	MP-2 PORT 9	Water	05/02/2005	14:48	05/04/2005	08:29

LABORATORY TEST RESULTS

Job Number: 294993

Date: 05/06/2005

CUSTOMER: STL Westfield

PROJECT: 225093

ATTN: Rebecca Mason

Customer Sample ID: MP-2 PORT 15  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 12:13  
Sample Matrix.....: Water

Laboratory Sample ID: 294993-1  
Date Received.....: 05/04/2005  
Time Received.....: 08:29

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/05/05	daw

Job Number: 294993

## LABORATORY TEST RESULTS

Date: 05/06/2005

CUSTOMER: STL Westfield

PROJECT: 225093

ATTN: Rebecca Mason

Customer Sample ID: MP-2 PORT 11

Date Sampled.....: 05/02/2005

Time Sampled.....: 13:57

Sample Matrix.....: Water

Laboratory Sample ID: 294993-2

Date Received.....: 05/04/2005

Time Received.....: 08:29

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/05/05	daw

## LABORATORY TEST RESULTS

Job Number: 294993

Date: 05/06/2005

CUSTOMER: STL Westfield

PROJECT: 225093

ATTN: Rebecca Mason

Customer Sample ID: MP-2 PORT 10

Date Sampled.....: 05/02/2005

Time Sampled.....: 14:24

Sample Matrix.....: Water

Laboratory Sample ID: 294993-3

Date Received.....: 05/04/2005

Time Received.....: 08:29

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/05/05	daw



LABORATORY TEST RESULTS

Job Number: 294993

Date: 05/06/2005

CUSTOMER: STL Westfield

PROJECT: 225093

ATTN: Rebecca Mason

Customer Sample ID: MP-2 PORT 9  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 14:48  
Sample Matrix.....: Water

Laboratory Sample ID: 294993-4  
Date Received.....: 05/04/2005  
Time Received.....: 08:29

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.01		0.01	g/mL	05/05/05	daw

LABORATORY CHRONICLE				
Job Number: 294993		Date: 05/06/2005		
CUSTOMER: STL Westfield		PROJECT: 225093		ATTN: Rebecca Mason
Lab ID: 294993-1	Client ID: MP-2 PORT 15	Date Recvd: 05/04/2005		Sample Date: 05/02/2005
METHOD	DESCRIPTION	RUN#	BATCH#	DATE/TIME ANALYZED
ASTM D70	Specific Gravity	1	128633	05/05/2005 1502
Lab ID: 294993-2	Client ID: MP-2 PORT 11	Date Recvd: 05/04/2005		Sample Date: 05/02/2005
METHOD	DESCRIPTION	RUN#	BATCH#	DATE/TIME ANALYZED
ASTM D70	Specific Gravity	1	128633	05/05/2005 1502
Lab ID: 294993-3	Client ID: MP-2 PORT 10	Date Recvd: 05/04/2005		Sample Date: 05/02/2005
METHOD	DESCRIPTION	RUN#	BATCH#	DATE/TIME ANALYZED
ASTM D70	Specific Gravity	1	128633	05/05/2005 1502
Lab ID: 294993-4	Client ID: MP-2 PORT 9	Date Recvd: 05/04/2005		Sample Date: 05/02/2005
METHOD	DESCRIPTION	RUN#	BATCH#	DATE/TIME ANALYZED
ASTM D70	Specific Gravity	1	128633	05/05/2005 1502







Steve Morrow  
Olin Chemical  
1186 Lower River Road  
PO Box 248  
Charleston, TN 37310-0248

STL Westfield  
53 Southampton Road  
Westfield, MA 01085

Tel: 413 572 4000 Fax: 413 572 3707  
www.stl-inc.com

05/19/2005

Report Number: 225138

Dear Steve Morrow,

MP-2 (2 of 2)  
and MP-1

The analysis of your sample(s) submitted on 05/03/2005 is now complete and the appropriate analytical report is enclosed. The samples were prepared and analyzed according to established methodologies and protocols. All holding times were met for the methods performed on these samples, unless otherwise noted in the report's case narrative.

If you have any questions regarding this report, please contact your Project Manager, Rebecca C. Mason.

For questions, concerns or comments regarding our service, please do not hesitate to contact me directly. Thank you for selecting STL Westfield, and we look forward to working with you on future projects.

Steven C. Hartmann  
Laboratory Director  
STL WESTFIELD

Technical Review: 

Total number of pages in this report: 57

# MADEP MCP Analytical Method Report Certification Form

Laboratory Name: **Severn Trent Laboratory (STL) Westfield** Project #: **225138**

Project Location: **Geomega Column Testing** MADEP RTN<sup>1</sup>:

This form provides certifications for the following data set:[list Laboratory Sample ID Number(s)]  
225138-1-11

Sample Matrices:	Groundwater	Soil/Sediment	Drinking Water	Other:
<b>MCP SW-846</b>	8260B ( )	8151A ( )	8330 ( )	6010B ( <b>x</b> ) 7470A/1A ( ) Other ( )
<b>Methods Used</b>	8270C ( )	8081A ( )	VPH ( )	6020 ( ) 9014M <sup>2</sup> ( )
As specified in MADEP Compendium of Analytical Methods. (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S <sup>3</sup> ( ) 7196A ( )
	1 List Release Tracking Number (RTN), if known			
	2 M - SW-846 Method 9014 or MADEP Physiologically Available Cyanide (PAC) Method			
	3 S - SW-846 Methods 7000 Series List individual method and analyte.			

**An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status**

<b>A</b>	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	<b>Yes</b> No <sup>1</sup>
<b>B</b>	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	<b>Yes</b> No <sup>1</sup>
<b>C</b>	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in Section 2.0 (a), (b), (c) and (d) of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	<b>Yes</b> N/A No <sup>1</sup>
<b>D</b>	<b>VPH and EPH methods only:</b> Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods)?	Yes <b>N/A</b> No <sup>1</sup>

**A response to questions E and F below is required for "Presumptive Certainty" status**

<b>E</b>	Were all QC performance standards and recommendations for the specified methods achieved?	<b>Yes</b> No <sup>1</sup>
<b>F</b>	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes N/A <b>No<sup>1</sup></b>

<sup>1</sup> All Negative responses must be addressed in an attached Environmental Laboratory case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: 

Position: **Laboratory Director**

Printed Name: **Steven C. Hartmann**

Date: **5-19-08**

CAM VII A, Rev 3.2

April-04

**SEVERN  
TRENT**

**STL**

MADEP MA014  
NY DOH 10843  
RI DOH 57  
CT DPH 0494  
VT DECWSD

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NH DES 253901-A



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148 Rangeway Rd  
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Fax:(978)667-7871



# MADEP MCP Analytical Method Report Certification Form

Laboratory Name: **Severn Trent Laboratory (STL) Westfield** Project #: **225138**

Project Location: **Geomega Column Testing** MADEP RTN<sup>1</sup>:

This form provides certifications for the following data set:[list Laboratory Sample ID Number(s)]  
225138-1-11

Sample Matrices:	Groundwater	Soil/Sediment	Drinking Water	Other:
<b>MCP SW-846</b>	8260B ( )	8151A ( )	8330 ( )	6010B ( ) 7470A/1A ( ) Other ( x )
<b>Methods Used</b>	8270C ( )	8081A ( )	VPH ( )	6020 ( ) 9014M <sup>2</sup> ( )
As specified in MADEP Compendium of Analytical Methods. (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S <sup>3</sup> ( ) 7196A ( )
	1 List Release Tracking Number (RTN), if known			
	2 M - SW-846 Method 9014 or MADEP Physiologically Available Cyanide (PAC) Method			
	3 S - SW-846 Methods 7000 Series List individual method and analyte.			

## An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status

<b>A</b>	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	<input checked="" type="radio"/> Yes	No <sup>1</sup>
<b>B</b>	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	<input checked="" type="radio"/> Yes	No <sup>1</sup>
<b>C</b>	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in Section 2.0 (a), (b), (c) and (d) of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	<input checked="" type="radio"/> Yes	N/A No <sup>1</sup>
<b>D</b>	<b>VPH and EPH methods only:</b> Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods)?	Yes <input checked="" type="radio"/> N/A	No <sup>1</sup>

## A response to questions E and F below is required for "Presumptive Certainty" status

<b>E</b>	Were all QC performance standards and recommendations for the specified methods achieved?	<input checked="" type="radio"/> Yes	No <sup>1</sup>
<b>F</b>	Were results for all analyte-list compounds/elements for the specified method(s) reported?	<input checked="" type="radio"/> Yes	N/A No <sup>1</sup>

<sup>1</sup> All Negative responses must be addressed in an attached Environmental Laboratory case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: 

Position: Laboratory Director

Printed Name: Steven C. Hartmann

Date: 5-19-06

CAM VII A, Rev 3.2

April-04



MADEP MA014  
NY DOH 10843  
RI DOH 57  
CT DPH 0494  
VT DECWSD

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NH DES 253901-A



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## MCP CASE NARRATIVE

**Client:** Olin Chemical

**Report Number:** 225138

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues as stipulated in the MCP reporting requirements.

In order to facilitate report review, a separate MCP Analytical Method Report Certification Form is included for each method requested.

It should be noted that samples with elevated Reporting Limits (RLs) as a result of a dilution may not be able to satisfy "MCP program" reporting limits in some cases if the "adjusted" RL is greater than the applicable MCP standards or criterion to which the concentration is being compared. Such increases in the RLs are unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes, which exceed the calibration range.

Calculations are performed before rounding to avoid round-off errors in calculated results. All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

The project samples were received on 05/03/05; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt at the laboratory was 7.0°C.

### **Subcontract**

ASTM D70 method was performed by STL Houston, 6310 Rothway Drive, Houston, TX 77040.

### **SW846 6010B**

All QA/QC procedures required for the specified analytical method were performed as per section B of the MADEP MCP analytical method report Certification form.

All QC performance standards and recommendations for this specific method were achieved.

General method information:

At the request of the client, an abbreviated/modified MCP analyte list was reported for this job.

**The following reported method is not listed in the MADEP Massachusetts Contingency Plan (MCP) Compendium of Analytical Methods (CAM), pursuant to the provisions of 310 CMR 40.0017(2).**

### **LAC 10-107061B (Ammonia)**

All QC performance standards and recommendations for this specific method were achieved.



**EPA 300.0 (Chloride)**

All QC performance standards and recommendations for this specific method were achieved.

**EPA 300.0 (Sulfate)**

All QC performance standards and recommendations for this specific method were achieved.

**LAC 10-107041A (Nitrate)**

All QC performance standards and recommendations for this specific method were achieved.

General method information:

Samples 225138-2,3 & 11 had high intrinsic color. In order to prevent color interference with the colorimetric method used for nitrate determination, the samples were diluted prior to analysis. The RL was adjusted accordingly for these samples.

**SM18 4500NO2 B (Nitrite)**

All QC performance standards and recommendations for this specific method were achieved.

General method information:

Samples 225138-2,3 & 11 had high intrinsic color. In order to prevent color interference with the colorimetric method used for nitrite determination, the samples were diluted prior to analysis. The RL was adjusted accordingly for these samples.

SAMPLE INFORMATION

Date: 05/19/2005

Job Number.: 225138  
Customer...: Olin Chemical  
Attn.....: Steve Morrow

Project Number.....: 20000348  
Customer Project ID....: C03303B  
Project Description....: Geomega Column Testing

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
225138-1	MP-2 Port 6	Water	05/02/2005	16:14	05/03/2005	18:30
225138-2	MP-2 Port 4	Water	05/02/2005	16:45	05/03/2005	18:30
225138-3	MP-2 Port 1	Water	05/02/2005	17:38	05/03/2005	18:30
225138-4	MP-1 Port 17	Water	05/03/2005	10:06	05/03/2005	18:30
225138-5	MP-1 Port 8	Water	05/03/2005	14:42	05/03/2005	18:30
225138-6	MP-1 Port 7	Water	05/03/2005	14:47	05/03/2005	18:30
225138-7	MP-1 Port 6	Water	05/03/2005	14:52	05/03/2005	18:30
225138-8	MP-1 Port 5	Water	05/03/2005	15:00	05/03/2005	18:30
225138-9	MP-1 Port 5B	Water	05/03/2005	15:05	05/03/2005	18:30
225138-10	MP-1 Port 4	Water	05/03/2005	15:10	05/03/2005	18:30
225138-11	MP-1 Port 1	Water	05/03/2005	15:15	05/03/2005	18:30

# LABORATORY TEST RESULTS

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-2 Port 6  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 16:14  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-1  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	2300		1000	mg/L	05/16/05	kmm
EPA300.0 PartA	Sulfate	9000		2000	mg/L	05/16/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	1600		100	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	ND	U	0.050	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	320000		20000	ug/L	05/05/05	bpg
	Iron (Fe), Diss.	320000		5000	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	160000		20000	ug/L	05/05/05	bpg
	Sodium (Na), Diss.	2500000		200000	ug/L	05/05/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	250000		10000	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	68000		500	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

Page 2



STL

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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148 Rangeway Rd.  
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Fax: (978) 667-7871

# LABORATORY TEST RESULTS

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-2 Port 4  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 16:45  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-2  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	2700		1000	mg/L	05/16/05	kmm
EPA300.0 PartA	Sulfate	12000		2000	mg/L	05/16/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.10	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	3900		100	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	2.0		1.0	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	480000		200000	ug/L	05/05/05	bpg
	Iron (Fe), Diss.	820000		50000	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	610000		200000	ug/L	05/05/05	bpg
	Sodium (Na), Diss.	7700000		2000000	ug/L	05/05/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	1100000		100000	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	600000		5000	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

Page 3

SEVERN  
TRENT

STL

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RIDOH57  
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**LABORATORY TEST RESULTS**

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-2 Port 1  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 17:38  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-3  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	4300		1000	mg/L	05/16/05	kmm
EPA300.0 PartA	Sulfate	20000		2000	mg/L	05/16/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.50	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	12000		100	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	4.1		2.5	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	570000		200000	ug/L	05/05/05	bpg
	Iron (Fe), Diss.	2200000		50000	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	1300000		200000	ug/L	05/05/05	bpg
	Sodium (Na), Diss.	21000000		2000000	ug/L	05/05/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	2200000		100000	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	3000000		5000	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

Page 4



**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
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# LABORATORY TEST RESULTS

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-1 Port 17  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 10:06  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-4  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	29		1.0	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	2600		100	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.50	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	0.76		0.10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	4.8		0.050	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP) Calcium (Ca), Diss. Iron (Fe), Diss. Magnesium (Mg), Diss. Sodium (Na), Diss.	610000 ND 11000 100000	U	400 100 400 4000	ug/L ug/L ug/L ug/L	05/05/05 05/05/05 05/05/05 05/05/05	bpg bpg bpg bpg
SW846 6010B	Metals Analysis (ICP) Aluminum (Al), Diss. Chromium (Cr), Diss.	ND ND	U U	200 10	ug/L ug/L	05/05/05 05/05/05	bpg bpg

\* In Description = Dry Wgt.

Page 5



STL

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
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Fax: (978) 667-7871

# LABORATORY TEST RESULTS

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-1 Port 8  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 14:42  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-5  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	58		10	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	480		20	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	0.34		0.020	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	46		1.0	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	2.9		0.050	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	140000	ND	200	ug/L	05/05/05	bpg
	Iron (Fe), Diss.			50	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	4400		200	ug/L	05/05/05	bpg
SW846 6010B	Sodium (Na), Diss.	98000		2000	ug/L	05/05/05	bpg
	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	110		100	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	15		5.0	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

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STL

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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N. Billerica, MA 01862  
Tel: (978) 667-1400  
Fax: (978) 667-7871

# LABORATORY TEST RESULTS

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-1 Port 7  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 14:47  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-6  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	110		10	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	380		200	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	160		1.0	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	1.3		0.050	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	260000		200	ug/L	05/05/05	bpg
	Iron (Fe), Diss.	ND	U	50	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	16000		200	ug/L	05/05/05	bpg
SW846 6010B	Sodium (Na), Diss.	220000		2000	ug/L	05/05/05	bpg
	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	ND	U	100	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	24		5.0	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

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STL

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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LABORATORY TEST RESULTS

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C033038

ATTN: Steve Morrow

Customer Sample ID: MP-1 Port 6  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 14:52  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-7  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	50		1.0	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	550		200	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	520		10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	0.14		0.050	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	410000		400	ug/L	05/05/05	bpg
	Iron (Fe), Diss.	420		100	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	74000		400	ug/L	05/05/05	bpg
	Sodium (Na), Diss.	450000		4000	ug/L	05/05/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	300		200	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	37		10	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

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**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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# LABORATORY TEST RESULTS

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-1 Port 5  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 15:00  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-8  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	490		100	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	3900		200	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	590		10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	0.21		0.050	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	430000		400	ug/L	05/05/05	bpg
	Iron (Fe), Diss.	1700		100	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	100000		400	ug/L	05/05/05	bpg
	Sodium (Na), Diss.	560000		4000	ug/L	05/05/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	9300		200	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	470		10	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

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STL

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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# LABORATORY TEST RESULTS

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C033038

ATTN: Steve Morrow

Customer Sample ID: MP-1 Port 5B  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 15:05  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-9  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	210		20	mg/L	05/18/05	kmm
EPA300.0 PartA	Sulfate	300		200	mg/L	05/17/05	kmm
SM18 4500N02 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	560		10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	0.22		0.050	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	440000		400	ug/L	05/05/05	bpg
	Iron (Fe), Diss.	1700		100	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	100000		400	ug/L	05/05/05	bpg
	Sodium (Na), Diss.	570000		4000	ug/L	05/05/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	9600		200	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	500		10	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

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STL

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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# LABORATORY TEST RESULTS

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-1 Port 4  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 15:10  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-10  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	110		100	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	790		200	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	1100		10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	2.0		0.050	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	450000		2000	ug/L	05/05/05	bpg
	Iron (Fe), Diss.	2600		500	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	270000		2000	ug/L	05/05/05	bpg
	Sodium (Na), Diss.	1300000		20000	ug/L	05/05/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	140000		1000	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	14000		50	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

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STL

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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# LABORATORY TEST RESULTS

Job Number: 225138

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP-1 Port 1  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 15:15  
Sample Matrix.....: Water

Laboratory Sample ID: 225138-11  
Date Received.....: 05/03/2005  
Time Received.....: 18:30

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	590		1.0	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	4700		2000	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.50	mg/L	05/04/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	9700		100	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	3.1		2.5	mg/L	05/04/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	600000		200000	ug/L	05/05/05	bpg
	Iron (Fe), Diss.	3300000		50000	ug/L	05/05/05	bpg
	Magnesium (Mg), Diss.	1700000		200000	ug/L	05/05/05	bpg
	Sodium (Na), Diss.	20000000		2000000	ug/L	05/05/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	2100000		100000	ug/L	05/05/05	bpg
	Chromium (Cr), Diss.	2100000		5000	ug/L	05/05/05	bpg

\* In Description = Dry Wgt.

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MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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Fax: (978) 667-7871

## Date: 05/19/2005

ATTN: Steve Morrow

Date Recvd: 05/03/2005    Sample Date: 05/03/2005

RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED	DILUTION
1	43584			05/06/2005 0000	100

Date: 05/19/2005

ATTN: Steve Morrow



**SUBCONTRACTED  
DATA**

## ANALYTICAL REPORT

JOB NUMBER: 295072

Project ID: 225138

Prepared For:

STL Westfield  
53 Southampton Road  
Westfield, MA 01085

Attention: Rebecca Mason

Date: 05/16/2005

Signature

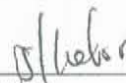


Name: Sean V. Sundquist

Title: Project Manager III

E-Mail: ssundquist@stl-inc.com

Date



Severn Trent Laboratories  
6310 Rothway Drive  
Houston, TX 77040

PHONE: 713-690-4444

TOTAL NO. OF PAGES

22

05/16/2005

Rebecca Mason  
STL Westfield  
53 Southampton Road  
Westfield, MA 01085

Reference:

Project : Specific Gravity  
Project No. : 295072  
Date Received : 05/05/2005  
STL Job : 295072

Dear Rebecca Mason:

Enclosed are the analytical results for your project referenced above. The following samples are included in the report.

- |                 |                 |
|-----------------|-----------------|
| 1. MP-2 PORT 6  | 2. MP-2 PORT 4  |
| 3. MP-2 PORT 1  | 4. MP-1 PORT 17 |
| 5. MP-1 PORT 8  | 6. MP-1 PORT 7  |
| 7. MP-1 PORT 6  | 8. MP-1 PORT 5  |
| 9. MP-1 PORT 5B | 10. MP-1 PORT 4 |
| 11. MP-1 PORT 1 |                 |

All holding times were met for the tests performed on these samples.

Enclosed, please find the Quality Control Summary. All quality control results for the QC batch that are applicable to the sample(s) are acceptable except as noted in the QC batch reports.

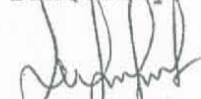
The test results in this report meet all NELAP requirements for STL Houston's NELAP accredited parameters. Any exceptions to NELAP requirements will be noted and included in a case narrative as a part of this report.

If the report is acceptable, please approve the enclosed invoice and forward it for payment.

Thank you for selecting Severn-Trent Laboratories to serve as your analytical laboratory on this project. If you have any questions concerning these results, please feel free to contact me at any time.

We look forward to working with you on future projects.

Sincerely,



Sean W. Sundquist  
Project Manager

## SAMPLE INFORMATION

Date: 05/16/2005

Job Number.: 295072  
Customer...: STL Westfield  
Attn.....: Rebecca Mason

Project Number.....: 99005907  
Customer Project ID....: 225138  
Project Description....: Specific Gravity

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
295072-1	MP-2 PORT 6	Water	05/02/2005	16:14	05/05/2005	08:41
295072-2	MP-2 PORT 4	Water	05/02/2005	16:45	05/05/2005	08:41
295072-3	MP-2 PORT 1	Water	05/02/2005	17:38	05/05/2005	08:41
295072-4	MP-1 PORT 17	Water	05/03/2005	10:06	05/05/2005	08:41
295072-5	MP-1 PORT 8	Water	05/03/2005	14:42	05/05/2005	08:41
295072-6	MP-1 PORT 7	Water	05/03/2005	14:47	05/05/2005	08:41
295072-7	MP-1 PORT 6	Water	05/03/2005	14:52	05/05/2005	08:41
295072-8	MP-1 PORT 5	Water	05/03/2005	15:00	05/05/2005	08:41
295072-9	MP-1 PORT 5B	Water	05/03/2005	15:05	05/05/2005	08:41
295072-10	MP-1 PORT 4	Water	05/03/2005	15:10	05/05/2005	08:41
295072-11	MP-1 PORT 1	Water	05/03/2005	15:15	05/05/2005	08:41





# STL

## LABORATORY TEST RESULTS

Job Number: 295072

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Customer Sample ID: MP-2 PORT 6  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 16:14  
Sample Matrix.....: Water

Laboratory Sample ID: 295072-1  
Date Received.....: 05/05/2005  
Time Received.....: 08:41

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.02		0.01	g/mL	05/16/05	sur

LABORATORY TEST RESULTS

Job Number: 295072

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Customer Sample ID: MP-2 PORT 4  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 16:45  
Sample Matrix.....: Water

Laboratory Sample ID: 295072-2  
Date Received.....: 05/05/2005  
Time Received.....: 08:41

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.05		0.01	g/mL	05/16/05	sur



Job Number: 295072

## LABORATORY TEST RESULTS

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Customer Sample ID: MP-2 PORT 1  
Date Sampled.....: 05/02/2005  
Time Sampled.....: 17:38  
Sample Matrix.....: Water

Laboratory Sample ID: 295072-3  
Date Received.....: 05/05/2005  
Time Received.....: 08:41

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.11		0.01	g/mL	05/16/05	sur

LABORATORY TEST RESULTS

Job Number: 295072

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Customer Sample ID: MP-1 PORT 17  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 10:06  
Sample Matrix.....: Water

Laboratory Sample ID: 295072-4  
Date Received.....: 05/05/2005  
Time Received.....: 08:41

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/16/05	sur

## Job Number: 295072

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Customer Sample ID: MP-1 PORT 8  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 14:42  
Sample Matrix.....: Water

Laboratory Sample ID: 295072-5  
Date Received.....: 05/05/2005  
Time Received.....: 08:41

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/16/05	sur

## LABORATORY TEST RESULTS

Job Number: 295072

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Customer Sample ID: MP-1 PORT 7  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 14:47  
Sample Matrix.....: Water

Laboratory Sample ID: 295072-6  
Date Received.....: 05/05/2005  
Time Received.....: 08:41

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/16/05	sur

LABORATORY TEST RESULTS

Job Number: 295072

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Customer Sample ID: MP-1 PORT 6  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 14:52  
Sample Matrix.....: Water

Laboratory Sample ID: 295072-7  
Date Received.....: 05/05/2005  
Time Received.....: 08:41

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.01		0.01	g/mL	05/16/05	sur

LABORATORY TEST RESULTS							
Job Number: 295072		Date: 05/16/2005					
CUSTOMER: STL Westfield		PROJECT: 225138		ATTN: Rebecca Mason			
Customer Sample ID: MP-1 PORT 5 Date Sampled.....: 05/03/2005 Time Sampled.....: 15:00 Sample Matrix.....: Water				Laboratory Sample ID: 295072-8 Date Received.....: 05/05/2005 Time Received.....: 08:41			
TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.01		0.01	g/mL	05/16/05	sur



## LABORATORY TEST RESULTS

Job Number: 295072

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Customer Sample ID: MP-1 PORT 5B

Date Sampled.....: 05/03/2005

Time Sampled.....: 15:05

Sample Matrix.....: Water

Laboratory Sample ID: 295072-9

Date Received.....: 05/05/2005

Time Received.....: 08:41

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/16/05	sur

## LABORATORY TEST RESULTS

Job Number: 295072

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Customer Sample ID: MP-1 PORT 4  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 15:10  
Sample Matrix.....: Water

Laboratory Sample ID: 295072-10  
Date Received.....: 05/05/2005  
Time Received.....: 08:41

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.01		0.01	g/mL	05/16/05	sur

## LABORATORY TEST RESULTS

Job Number: 295072

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Customer Sample ID: MP-1 PORT 1  
Date Sampled.....: 05/03/2005  
Time Sampled.....: 15:15  
Sample Matrix.....: Water

Laboratory Sample ID: 295072-11  
Date Received.....: 05/05/2005  
Time Received.....: 08:41

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.11		0.01	g/mL	05/16/05	sur

## LABORATORY CHRONICLE

Job Number: 295072

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225138

ATTN: Rebecca Mason

Lab ID: 295072-1	Client ID: MP-2 PORT 6	Date Recvd: 05/05/2005	Sample Date: 05/02/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295072-2	Client ID: MP-2 PORT 4	Date Recvd: 05/05/2005	Sample Date: 05/02/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295072-3	Client ID: MP-2 PORT 1	Date Recvd: 05/05/2005	Sample Date: 05/02/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295072-4	Client ID: MP-1 PORT 17	Date Recvd: 05/05/2005	Sample Date: 05/03/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295072-5	Client ID: MP-1 PORT 8	Date Recvd: 05/05/2005	Sample Date: 05/03/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295072-6	Client ID: MP-1 PORT 7	Date Recvd: 05/05/2005	Sample Date: 05/03/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295072-7	Client ID: MP-1 PORT 6	Date Recvd: 05/05/2005	Sample Date: 05/03/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295072-8	Client ID: MP-1 PORT 5	Date Recvd: 05/05/2005	Sample Date: 05/03/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295072-9	Client ID: MP-1 PORT 5B	Date Recvd: 05/05/2005	Sample Date: 05/03/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295072-10	Client ID: MP-1 PORT 4	Date Recvd: 05/05/2005	Sample Date: 05/03/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295072-11	Client ID: MP-1 PORT 1	Date Recvd: 05/05/2005	Sample Date: 05/03/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	



# Severn Trent Laboratories, Inc.

## Chain of Custody Form

SEVERN  
TRENT

STL

21695

•53 Southampton Road  
Westfield, MA 01085  
(P) 413-572-4000  
(F) 413-572-3707

•149 Rangeway Road  
N. Billerica, MA 01862  
(P) 978-667-1400  
(F) 978-667-7871

Client: <u>Geomega/Olin Corp</u>		Project #: <u>03303B</u>		Job# <u>21695</u>		Quote#	
Address: <u>2995 Baseline Rd Ste 202</u>		Project Manager: <u>Dan Stone</u>		STL Westfield		STL Billerica / Service Center	
Phone: <u>303-443-9117</u>		Work ID: <u>Boulder, CO 80303</u>		Contact: <u>Craig R. Wallace</u>		PO#	
Requested Turnaround Time (PLEASE SPECIFY)		Regulatory Classification		Analysis Requested		Shaded areas for office use	
STANDARD <input checked="" type="checkbox"/> RUSH <input type="checkbox"/>		NPDES <input type="checkbox"/> RCRA <input type="checkbox"/> Other <input type="checkbox"/>		Check analysis and specify method and analytes in comments section.		For example: 500-series for drinking water 600-series for waste water, NPDES 8000-series for groundwater, soil, waste Use comments section to further define.	
Sample Type Codes		Preservative		Comments			
WW-Wastewater DW-Drinking water SW-Surface water LW-Lab water GW-Groundwater A-Air S-Solid / Soil SL-Sludge O-Oil Z-Other		Comp. Grab		Please print legibility. If the analytical requests are not clearly defined on the chain-of-custody, the turnaround time will begin after all questions have been satisfactorily answered.			
Sample ID		Date Collected		All Samples are field filtered.			
MP-2 Port 6		5/2/5		Ammonia			
MP-2 Port 4		5/2/5		Specific Gravity			
MP-2 Port 1		5/2/5		Nitrate/Nitrite			
MP-1 Port 17		5/3/5		Chloride			
MP-1 Port 8		10/06		Sulfate			
" Port 7		14/2		Chromium			
" Port 6		14/7		Iron			
" Port 5		14/52		Magnesium			
" Port 5B		15/00		Sodium			
" Port 4		15/05		Aluminum			
" Port 1		15/15		Calcium			
Sampled by (print): <u>Craig R. Wallace</u>		Signature: <u>[Signature]</u>		MADEP Requirement Samples Iced? <u>Y / N</u>			
Relinquished by: <u>[Signature]</u>		Date: <u>5/3/0</u> Time: <u>15:30</u>		Cooler? <u>Y / N</u>			
Relinquished by: <u>[Signature]</u>		Date: <u>5/3/0</u> Time: <u>15:30</u>		Temp @ receipt: <u>7.0</u> °C			
Relinquished by: <u>[Signature]</u>		Date: <u>5/3/0</u> Time: <u>15:30</u>		Preservation / pH checked? <u>Y / N</u>			
Relinquished by: <u>[Signature]</u>		Date: <u>5/3/0</u> Time: <u>15:30</u>		By: <u>[Signature]</u> Date: <u>5/3/0</u>			

STL WESTFIELD

Page 1 of 1

White = Lab file Yellow = Report copy Pink = Customer copy  
STL 8245 (1000)

The first part of the paper discusses the importance of understanding the cultural context of the research. It highlights the need for researchers to be sensitive to the values and beliefs of the communities they are studying. This is particularly important in the field of education, where cultural differences can significantly impact learning outcomes. The paper then moves on to discuss the challenges of conducting research in diverse cultural settings. It notes that researchers often face difficulties in establishing rapport with participants and in interpreting their responses. To address these challenges, the paper suggests several strategies, including the use of local researchers and the development of culturally appropriate research instruments. The final part of the paper discusses the importance of ethical considerations in cross-cultural research. It emphasizes the need for researchers to obtain informed consent from participants and to ensure that the research is conducted in a way that respects the dignity and rights of all individuals.



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Tel: 413 572 4000 Fax: 413 572 3707  
www.stl-inc.com

Steve Morrow  
Olin Chemical  
1186 Lower River Road  
PO Box 248  
Charleston, TN 37310-0248

MP-3

05/19/2005

Report Number: 225191

Dear Steve Morrow,

The analysis of your sample(s) submitted on 05/04/2005 is now complete and the appropriate analytical report is enclosed. The samples were prepared and analyzed according to established methodologies and protocols. All holding times were met for the methods performed on these samples, unless otherwise noted in the report's case narrative.

If you have any questions regarding this report, please contact your Project Manager, Rebecca C. Mason.

For questions, concerns or comments regarding our service, please do not hesitate to contact me directly. Thank you for selecting STL Westfield, and we look forward to working with you on future projects.

Steven C. Hartmann  
Laboratory Director  
STL WESTFIELD

Technical Review: 

Total number of pages in this report: 58

# MADEP MCP Analytical Method Report Certification Form

Laboratory Name: **Severn Trent Laboratory (STL) Westfield** Project #: **225191**

Project Location: **Geomega Column Testing** MADEP RTN<sup>1</sup>:

This form provides certifications for the following data set:[list Laboratory Sample ID Number(s)]  
225191-1-7

Sample Matrices:	Groundwater	Soil/Sediment	Drinking Water	Other:
<b>MCP SW-846</b>	8260B ( )	8151A ( )	8330 ( )	6010B ( x ) 7470A/1A ( ) Other ( )
<b>Methods Used</b>	8270C ( )	8081A ( )	VPH ( )	6020 ( ) 9014M <sup>2</sup> ( )
As specified in MADEP Compendium of Analytical Methods. (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S <sup>3</sup> ( ) 7196A ( )
1 List Release Tracking Number (RTN), if known 2 M - SW-846 Method 9014 or MADEP Physiologically Available Cyanide (PAC) Method 3 S - SW-846 Methods 7000 Series List individual method and analyte.				

**An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status**

<b>A</b>	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	Yes <input checked="" type="radio"/> No <sup>1</sup>
<b>B</b>	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	Yes <input checked="" type="radio"/> No <sup>1</sup>
<b>C</b>	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in Section 2.0 (a), (b), (c) and (d) of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes <input checked="" type="radio"/> N/A No <sup>1</sup>
<b>D</b>	<b>VPH and EPH methods only:</b> Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods)?	Yes <input type="radio"/> N/A <input checked="" type="radio"/> No <sup>1</sup>

**A response to questions E and F below is required for "Presumptive Certainty" status**

<b>E</b>	Were all QC performance standards and recommendations for the specified methods achieved?	Yes <input type="radio"/> No <sup>1</sup> <input checked="" type="radio"/>
<b>F</b>	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes <input type="radio"/> N/A <input checked="" type="radio"/> No <sup>1</sup>

<sup>1</sup> All Negative responses must be addressed in an attached Environmental Laboratory case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: 

Position: Laboratory Director

Printed Name: Steven C. Hartmann

Date: 6-9-05

CAM VII A, Rev 3.2

April-04



MADEP MA014  
NY DOH 10843  
RI DOH 57  
CT DPH 0494  
VT DECWSD

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NH DES 253901-A



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# MADEP MCP Analytical Method Report Certification Form

Laboratory Name: **Severn Trent Laboratory (STL) Westfield** Project #: **225191**

Project Location: **Geomega Column Testing** MADEP RTN<sup>1</sup>:

This form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]  
225191-1-7

Sample Matrices:	Groundwater	Soil/Sediment	Drinking Water	Other:
<b>MCP SW-846</b>	8260B ( )	8151A ( )	8330 ( )	6010B ( ) 7470A/1A ( ) Other ( x )
<b>Methods Used</b>	8270C ( )	8081A ( )	VPH ( )	6020 ( ) 9014M <sup>2</sup> ( )
As specified in MADEP Compendium of Analytical Methods. (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S <sup>3</sup> ( ) 7196A ( )
1 List Release Tracking Number (RTN), if known 2 M - SW-846 Method 9014 or MADEP Physiologically Available Cyanide (PAC) Method 3 S - SW-846 Methods 7000 Series List individual method and analyte.				

**An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status**

<b>A</b>	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	<input checked="" type="radio"/> Yes	<input type="radio"/> No <sup>1</sup>
<b>B</b>	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	<input checked="" type="radio"/> Yes	<input type="radio"/> No <sup>1</sup>
<b>C</b>	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in Section 2.0 (a), (b), (c) and (d) of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	<input checked="" type="radio"/> Yes	<input type="radio"/> N/A <input type="radio"/> No <sup>1</sup>
<b>D</b>	<b>VPH and EPH methods only:</b> Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods)?	<input type="radio"/> Yes	<input checked="" type="radio"/> N/A <input type="radio"/> No <sup>1</sup>

**A response to questions E and F below is required for "Presumptive Certainty" status**

<b>E</b>	Were all QC performance standards and recommendations for the specified methods achieved?	<input checked="" type="radio"/> Yes	<input type="radio"/> No <sup>1</sup>
<b>F</b>	Were results for all analyte-list compounds/elements for the specified method(s) reported?	<input checked="" type="radio"/> Yes	<input type="radio"/> N/A <input type="radio"/> No <sup>1</sup>

<sup>1</sup> All Negative responses must be addressed in an attached Environmental Laboratory case narrative.

**I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.**

Signature:  Position: Laboratory Director

Printed Name: Steven C. Hartmann

Date: 5.19.05

CAM VII A, Rev 3.2

April-04

**SEVERN  
TRENT** **STL**

MADEP MA014  
NY DOH 10843  
RI DOH 57  
CT DPH 0494  
VT DECWSD

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NH DES 253901-A



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N. Billerica, MA 01862  
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Fax: (978) 667-7871

## MCP CASE NARRATIVE

**Client: Olin Chemical**

**Report Number: 225191**

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues as stipulated in the MCP reporting requirements.

In order to facilitate report review, a separate MCP Analytical Method Report Certification Form is included for each method requested.

It should be noted that samples with elevated Reporting Limits (RLs) as a result of a dilution may not be able to satisfy "MCP program" reporting limits in some cases if the "adjusted" RL is greater than the applicable MCP standards or criterion to which the concentration is being compared. Such increases in the RLs are unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes, which exceed the calibration range.

Calculations are performed before rounding to avoid round-off errors in calculated results. All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

The project samples were received on 05/04/05; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt at the laboratory was 7.8°C.

### **Subcontract**

ASTM D70 method was performed by STL Houston, 6310 Rothway Drive, Houston, TX 77040.

### **SW846 6010B**

All QA/QC procedures required for the specified analytical method were performed as per section B of the MADEP MCP analytical method report Certification form.

All QC performance standards and recommendations for this specific method were achieved with the exception of:

The matrix spike (MS) and MSD sample, 225191-1, recovered low and outside method control limits for sodium. The sample concentration overwhelmed the amount of spike added. Refer to pages 14-15 for details.

Chromium was detected in the method blank associated with batch 44059 at a concentration of 11.23µg/L. The associated samples were 225191-4-7. These samples were >10x the blank value, therefore all data is been reported.

The matrix spike (MS) and MSD sample, 225191-1, recovered low and outside method control limits for Chromium. Refer to page 24 for details.



General method information:

At the request of the client, an abbreviated/modified MCP analyte list was reported for this job.

**The following reported method is not listed in the MADEP Massachusetts Contingency Plan (MCP) Compendium of Analytical Methods (CAM), pursuant to the provisions of 310 CMR 40.0017(2).**

**LAC 10-107061B (Ammonia)**

All QC performance standards and recommendations for this specific method were achieved.

**EPA 300.0 (Chloride)**

All QC performance standards and recommendations for this specific method were achieved.

**EPA 300.0 (Sulfate)**

All QC performance standards and recommendations for this specific method were achieved.

**LAC 10-107041A (Nitrate)**

All QC performance standards and recommendations for this specific method were achieved.

**SM18 4500NO2 B (Nitrite)**

All QC performance standards and recommendations for this specific method were achieved.

General method information:

Samples 225191-6 & 7 had high intrinsic color. In order to prevent color interference with the colorimetric method used for nitrite determination, the samples were diluted prior to analysis. The RL was adjusted accordingly for these samples.

S A M P L E   I N F O R M A T I O N

Date: 05/19/2005

Job Number.: 225191  
Customer...: Olin Chemical  
Attn.....: Steve Morrow

Project Number.....: 20000348  
Customer Project ID....: C03303B  
Project Description....: Geomega Column Testing

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
225191-1	MP3 Port 19	Water	05/04/2005	11:48	05/04/2005	18:40
225191-2	MP3 Port 13	Water	05/04/2005	12:00	05/04/2005	18:40
225191-3	MP3 Port 7	Water	05/04/2005	12:11	05/04/2005	18:40
225191-4	MP3 Port 5	Water	05/04/2005	12:18	05/04/2005	18:40
225191-5	MP3 Port 4	Water	05/04/2005	12:23	05/04/2005	18:40
225191-6	MP3 Port 3	Water	05/04/2005	12:28	05/04/2005	18:40
225191-7	MP3 Port 1	Water	05/04/2005	12:34	05/04/2005	18:40



LABORATORY TEST RESULTS

Job Number: 225191

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP3 Port 19  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 11:48  
Sample Matrix.....: Water

Laboratory Sample ID: 225191-1  
Date Received.....: 05/04/2005  
Time Received.....: 18:40

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	210		10	mg/L	05/18/05	kmm
EPA300.0 PartA	Sulfate	78		20	mg/L	05/18/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/05/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	16		0.10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	2.4		0.050	mg/L	05/05/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	33000		200	ug/L	05/16/05	bpg
	Iron (Fe), Diss.	ND	U	50	ug/L	05/16/05	bpg
	Magnesium (Mg), Diss.	6300		200	ug/L	05/16/05	bpg
SW846 6010B	Sodium (Na), Diss.	100000		2000	ug/L	05/16/05	bpg
	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	ND	U	100	ug/L	05/16/05	bpg
	Chromium (Cr), Diss.	ND	U	5.0	ug/L	05/16/05	bpg

\* In Description = Dry Wgt.

Page 2



MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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Fax: (978) 667-7871

LABORATORY TEST RESULTS

Job Number: 225191

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP3 Port 13  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 12:00  
Sample Matrix.....: Water

Laboratory Sample ID: 225191-2  
Date Received.....: 05/04/2005  
Time Received.....: 18:40

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	210		10	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	48		20	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/05/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	2.6		0.10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	0.49		0.050	mg/L	05/05/05	kmm
SW846 60108	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	38000		200	ug/L	05/16/05	bpg
	Iron (Fe), Diss.	ND	U	50	ug/L	05/16/05	bpg
	Magnesium (Mg), Diss.	6100		200	ug/L	05/16/05	bpg
SW846 60108	Sodium (Na), Diss.	100000		2000	ug/L	05/16/05	bpg
	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	ND	U	100	ug/L	05/16/05	bpg
	Chromium (Cr), Diss.	ND	U	5.0	ug/L	05/16/05	bpg

\* In Description = Dry Wgt.

Page 3



STL

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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Tel: (978) 667-1400  
Fax: (978) 667-7871

**LABORATORY TEST RESULTS**

Job Number: 225191

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP3 Port 7  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 12:11  
Sample Matrix.....: Water

Laboratory Sample ID: 225191-3  
Date Received.....: 05/04/2005  
Time Received.....: 18:40

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	250		10	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	210		20	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/05/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	50		1.0	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	1.7		0.050	mg/L	05/05/05	kmm
SW846 6010B	Metals Analysis (ICP) Calcium (Ca), Diss.	32000		200	ug/L	05/16/05	bpg
	Iron (Fe), Diss.	ND	U	50	ug/L	05/16/05	bpg
	Magnesium (Mg), Diss.	6700		200	ug/L	05/16/05	bpg
	Sodium (Na), Diss.	120000		2000	ug/L	05/16/05	bpg
SW846 6010B	Metals Analysis (ICP) Aluminum (Al), Diss.	130		100	ug/L	05/16/05	bpg
	Chromium (Cr), Diss.	ND	U	5.0	ug/L	05/16/05	bpg

\* In Description = Dry Wgt.

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**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



STL Westfield  
53 Southampton Rd.  
Westfield, MA 01085  
Tel: (413) 572-4000  
Fax: (413) 572-3707

STL Billerica-Service Center  
148 Rangeway Rd.  
N. Billerica, MA 01862  
Tel: (978) 667-1400  
Fax: (978) 667-7871

# LABORATORY TEST RESULTS

Job Number: 225191

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP3 Port 5  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 12:18  
Sample Matrix.....: Water

Laboratory Sample ID: 225191-4  
Date Received.....: 05/04/2005  
Time Received.....: 18:40

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	430		100	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	1900		200	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/05/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	1600		10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	5.4		0.050	mg/L	05/05/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	290000		1000	ug/L	05/16/05	bpg
	Iron (Fe), Diss.	9800		250	ug/L	05/16/05	bpg
	Magnesium (Mg), Diss.	210000		1000	ug/L	05/16/05	bpg
	Sodium (Na), Diss.	1800000		10000	ug/L	05/16/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	230000		500	ug/L	05/16/05	bpg
	Chromium (Cr), Diss.	11000		25	ug/L	05/16/05	bpg

\* In Description = Dry Wgt.

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**SEVERN**  
**TRENT**

**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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Fax: (978) 667-7871



**LABORATORY TEST RESULTS**

Job Number: 225191

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP3 Port 4  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 12:23  
Sample Matrix.....: Water

Laboratory Sample ID: 225191-5  
Date Received.....: 05/04/2005  
Time Received.....: 18:40

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	24000		1000	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	83000		2000	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/05/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	180		10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	9.1		0.050	mg/L	05/05/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	440000		2000	ug/L	05/16/05	bpg
	Iron (Fe), Diss.	10000		500	ug/L	05/16/05	bpg
	Magnesium (Mg), Diss.	320000		2000	ug/L	05/16/05	bpg
	Sodium (Na), Diss.	2600000		20000	ug/L	05/16/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	370000		1000	ug/L	05/16/05	bpg
	Chromium (Cr), Diss.	34000		50	ug/L	05/16/05	bpg

\* In Description = Dry Wgt.

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**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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Fax: (978) 667-7871

Job Number: 225191

## LABORATORY TEST RESULTS

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP3 Port 3  
 Date Sampled.....: 05/04/2005  
 Time Sampled.....: 12:28  
 Sample Matrix.....: Water

Laboratory Sample ID: 225191-6  
 Date Received.....: 05/04/2005  
 Time Received.....: 18:40

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	540		100	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	5600		2000	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.020	mg/L	05/05/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	3200		100	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	15		0.20	mg/L	05/05/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	510000		20000	ug/L	05/16/05	bpg
	Iron (Fe), Diss.	150000		5000	ug/L	05/16/05	bpg
	Magnesium (Mg), Diss.	620000		20000	ug/L	05/16/05	bpg
	Sodium (Na), Diss.	5700000		200000	ug/L	05/16/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	1100000		10000	ug/L	05/16/05	bpg
	Chromium (Cr), Diss.	220000		500	ug/L	05/16/05	bpg

\* In Description = Dry Wgt.

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STL

MADEP MA014  
 RIDOH57  
 CTDPH 0494  
 VT DECWSD  
 NH DES 253903-A

NELAP FL E87912 TOX  
 NELAP NJ MA008 TOX  
 NELAP NY 10843  
 NY DOH 10843



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LABORATORY TEST RESULTS

Job Number: 225191

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP3 Port 1  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 12:34  
Sample Matrix.....: Water

Laboratory Sample ID: 225191-7  
Date Received.....: 05/04/2005  
Time Received.....: 18:40

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	3200		100	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	4500		200	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.10	mg/L	05/05/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	5200		100	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	12		0.50	mg/L	05/05/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	580000		20000	ug/L	05/16/05	bpg
	Iron (Fe), Diss.	2200000		5000	ug/L	05/16/05	bpg
	Magnesium (Mg), Diss.	1000000		20000	ug/L	05/16/05	bpg
	Sodium (Na), Diss.	13000000		200000	ug/L	05/16/05	bpg
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	1700000		10000	ug/L	05/16/05	bpg
	Chromium (Cr), Diss.	960000		500	ug/L	05/16/05	bpg

\* In Description = Dry Wgt.

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**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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Fax: (978) 667-7871

## LABORATORY CHRONICLE

Job Number: 225191

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Lab ID: 225191-1	Client ID: MP3 Port 19	Date Recvd: 05/04/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44184			05/18/2005 0000
SW846 6010B	Metals Analysis (ICP)	1	44054			05/16/2005 1359
SW846 6010B	Metals Analysis (ICP)	1	44059			05/16/2005 1359
SW846 6010B	Metals Analysis (ICP)	1	44064			05/16/2005 1436
LAC 10-107041A	Nitrate Nitrogen as N	1	43514			05/05/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43515			05/05/2005 1306
DILUTION						10
Lab ID: 225191-2	Client ID: MP3 Port 13	Date Recvd: 05/04/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44126			05/17/2005 0000
SW846 6010B	Metals Analysis (ICP)	1	44054			05/16/2005 1409
SW846 6010B	Metals Analysis (ICP)	1	44059			05/16/2005 1409
SW846 6010B	Metals Analysis (ICP)	1	44064			05/16/2005 1454
LAC 10-107041A	Nitrate Nitrogen as N	1	43514			05/05/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43515			05/05/2005 1306
DILUTION						10
Lab ID: 225191-3	Client ID: MP3 Port 7	Date Recvd: 05/04/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44183			05/17/2005 0000
SW846 6010B	Metals Analysis (ICP)	1	44054			05/16/2005 1412
SW846 6010B	Metals Analysis (ICP)	1	44059			05/16/2005 1412
SW846 6010B	Metals Analysis (ICP)	1	44064			05/16/2005 1459
LAC 10-107041A	Nitrate Nitrogen as N	1	43514			05/05/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43515			05/05/2005 1306
DILUTION						10
Lab ID: 225191-4	Client ID: MP3 Port 5	Date Recvd: 05/04/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44183			05/17/2005 0000
SW846 6010B	Metals Analysis (ICP)	1	44054			05/16/2005 1502
SW846 6010B	Metals Analysis (ICP)	1	44059			05/16/2005 1502
LAC 10-107041A	Nitrate Nitrogen as N	1	43514			05/05/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43515			05/05/2005 1306
DILUTION						100
Lab ID: 225191-5	Client ID: MP3 Port 4	Date Recvd: 05/04/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44183			05/17/2005 0000
SW846 6010B	Metals Analysis (ICP)	1	44054			05/16/2005 1505
SW846 6010B	Metals Analysis (ICP)	1	44059			05/16/2005 1505
LAC 10-107041A	Nitrate Nitrogen as N	1	43514			05/05/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43515			05/05/2005 1306
DILUTION						100
Lab ID: 225191-6	Client ID: MP3 Port 3	Date Recvd: 05/04/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44183			05/17/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44183			05/17/2005 0000
SW846 6010B	Metals Analysis (ICP)	1	44054			05/16/2005 1432
SW846 6010B	Metals Analysis (ICP)	1	44059			05/16/2005 1432
LAC 10-107041A	Nitrate Nitrogen as N	1	43514			05/05/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43515			05/05/2005 1306
DILUTION						1000
						100
						1000
						100
						100
						4
						2

# LABORATORY CHRONICLE

Job Number: 225191

Date: 05/19/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Lab ID: 225191-7 Client ID: MP3 Port 1

Date Recvd: 05/04/2005 Sample Date: 05/04/2005

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED	DILUTION
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000	1000
EPA300.0 PartA	Ion Chromatography Analysis	1	44183			05/17/2005 0000	100
SW846 6010B	Metals Analysis (ICP)	1	44054			05/16/2005 1436	100
SW846 6010B	Metals Analysis (ICP)	1	44059			05/16/2005 1436	100
LAC 10-107041A	Nitrate Nitrogen as N	1	43514			05/05/2005 0000	10
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43515			05/05/2005 1306	10

**SUBCONTRACTED  
DATA**



## ANALYTICAL REPORT

JOB NUMBER: 295140  
Project ID: 225191

Prepared For:

STL Westfield  
53 Southampton Road  
Westfield, MA 01085

Attention: Rebecca Mason

Date: 05/16/2005

  
Signature

Name: Sean V. Sundquist

Title: Project Manager III

E-Mail: ssundquist@stl-inc.com

  
Date

Severn Trent Laboratories  
6310 Rothway Drive  
Houston, TX 77040

PHONE: 713-690-4444

TOTAL NO. OF PAGES

18

05/16/2005

Rebecca Mason  
STL Westfield  
53 Southampton Road  
Westfield, MA 01085

Reference:

Project : Specific Gravity  
Project No. : 295140  
Date Received : 05/06/2005  
STL Job : 295140

Dear Rebecca Mason:

Enclosed are the analytical results for your project referenced above. The following samples are included in the report.

1. MP3 PORT 19
2. MP3 PORT 13
3. MP3 PORT 7
4. MP3 PORT 5
5. MP3 PORT 4
6. MP3 PORT 3
7. MP3 PORT 1

All holding times were met for the tests performed on these samples.

Enclosed, please find the Quality Control Summary. All quality control results for the QC batch that are applicable to the sample(s) are acceptable except as noted in the QC batch reports.

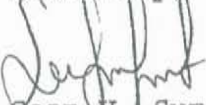
The test results in this report meet all NELAP requirements for STL Houston's NELAP accredited parameters. Any exceptions to NELAP requirements will be noted and included in a case narrative as a part of this report.

If the report is acceptable, please approve the enclosed invoice and forward it for payment.

Thank you for selecting Severn-Trent Laboratories to serve as your analytical laboratory on this project. If you have any questions concerning these results, please feel free to contact me at any time.

We look forward to working with you on future projects.

Sincerely,



Sean W. Sundquist  
Project Manager



SAMPLE INFORMATION  
Date: 05/16/2005Job Number.: 295140  
Customer...: STL Westfield  
Attn.....: Rebecca MasonProject Number.....: 99005907  
Customer Project ID....: 225191  
Project Description....: Specific Gravity

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
295140-1	MP3 PORT 19	Water	05/04/2005	11:48	05/06/2005	08:44
295140-2	MP3 PORT 13	Water	05/04/2005	12:00	05/06/2005	08:44
295140-3	MP3 PORT 7	Water	05/04/2005	12:11	05/06/2005	08:44
295140-4	MP3 PORT 5	Water	05/04/2005	12:18	05/06/2005	08:44
295140-5	MP3 PORT 4	Water	05/04/2005	12:23	05/06/2005	08:44
295140-6	MP3 PORT 3	Water	05/04/2005	12:28	05/06/2005	08:44
295140-7	MP3 PORT 1	Water	05/04/2005	12:34	05/06/2005	08:44

## LABORATORY TEST RESULTS

Job Number: 295140

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225191

ATTN: Rebecca Mason

Customer Sample ID: MP3 PORT 19  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 11:48  
Sample Matrix.....: Water

Laboratory Sample ID: 295140-1  
Date Received.....: 05/06/2005  
Time Received.....: 08:44

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/16/05	sur

## LABORATORY TEST RESULTS

Job Number: 295140

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225191

ATTN: Rebecca Mason

Customer Sample ID: MP3 PORT 13  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 12:00  
Sample Matrix.....: Water

Laboratory Sample ID: 295140-2  
Date Received.....: 05/06/2005  
Time Received.....: 08:44

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/16/05	sur

LABORATORY TEST RESULTS		Date: 05/16/2005					
Job Number: 295140		CUSTOMER: STL Westfield		PROJECT: 225191		ATTN: Rebecca Mason	
Customer Sample ID: MP3 PORT 7 Date Sampled.....: 05/04/2005 Time Sampled.....: 12:11 Sample Matrix.....: Water				Laboratory Sample ID: 295140-3 Date Received.....: 05/06/2005 Time Received.....: 08:44			
TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/16/05	sur

LABORATORY TEST RESULTS

Job Number: 295140

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225191

ATTN: Rebecca Mason

Customer Sample ID: MP3 PORT 5  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 12:18  
Sample Matrix.....: Water

Laboratory Sample ID: 295140-4  
Date Received.....: 05/06/2005  
Time Received.....: 08:44

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, liquid	1.0		0.01	g/mL	05/16/05	sur

## LABORATORY TEST RESULTS

Job Number: 295140

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225191

ATTN: Rebecca Mason

Customer Sample ID: MP3 PORT 4  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 12:23  
Sample Matrix.....: Water

Laboratory Sample ID: 295140-5  
Date Received.....: 05/06/2005  
Time Received.....: 08:44

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.02		0.01	g/mL	05/16/05	sur



LABORATORY TEST RESULTS		Date: 05/16/2005					
Job Number: 295140		CUSTOMER: STL Westfield		PROJECT: 225191		ATTN: Rebecca Mason	
Customer Sample ID: MP3 PORT 3 Date Sampled.....: 05/04/2005 Time Sampled.....: 12:28 Sample Matrix.....: Water				Laboratory Sample ID: 295140-6 Date Received.....: 05/06/2005 Time Received.....: 08:44			
TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.03		0.01	g/mL	05/16/05	sur

Job Number: 295140		LABORATORY TEST RESULTS			Date: 05/16/2005		
CUSTOMER: STL Westfield		PROJECT: 225191		ATTN: Rebecca Mason			
Customer Sample ID: MP3 PORT 1 Date Sampled.....: 05/04/2005 Time Sampled.....: 12:34 Sample Matrix.....: Water				Laboratory Sample ID: 295140-7 Date Received.....: 05/06/2005 Time Received.....: 08:44			
TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.06		0.01	g/mL	05/16/05	sur

## LABORATORY CHRONICLE

Job Number: 295140

Date: 05/16/2005

CUSTOMER: STL Westfield

PROJECT: 225191

ATTN: Rebecca Mason

Lab ID: 295140-1	Client ID: MP3 PORT 19	Date Recvd: 05/06/2005	Sample Date: 05/04/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295140-2	Client ID: MP3 PORT 13	Date Recvd: 05/06/2005	Sample Date: 05/04/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295140-3	Client ID: MP3 PORT 7	Date Recvd: 05/06/2005	Sample Date: 05/04/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295140-4	Client ID: MP3 PORT 5	Date Recvd: 05/06/2005	Sample Date: 05/04/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295140-5	Client ID: MP3 PORT 4	Date Recvd: 05/06/2005	Sample Date: 05/04/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295140-6	Client ID: MP3 PORT 3	Date Recvd: 05/06/2005	Sample Date: 05/04/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	
Lab ID: 295140-7	Client ID: MP3 PORT 1	Date Recvd: 05/06/2005	Sample Date: 05/04/2005	
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED	DILUTION
ASTM D70	Specific Gravity	1 129337	05/16/2005 1530	



# Sewern Trent Laboratories, Inc. Chain of Custody Form



21310

• 53 Southampton Road  
Westfield, MA 01085  
(P) 413-572-4000  
(F) 413-572-3707

• 149 Rangeway Road  
N. Billerica, MA 01862  
(P) 978-667-1400  
(F) 978-667-7871

Client: <u>Greenege / Olin Corp</u>		Project #: <u>C03303B</u>		Job# <u>22519</u> Quote#		STL Westfield PO#	
Address: <u>2995 Baseline Rd Ste 202</u>		Project Manager: <u>Dan Stone</u>		Shaded areas for office use		Comments	
City: <u>Boulder CO</u> Zip: <u>80303</u>		Work ID: _____		Analysis Requested		(Special Instructions)	
Phone: <u>303 443 9117</u> Fax: <u>303 938 8123</u>		Contact: <u>Craig R. Walker</u>		Check analysis and specify method and analytes in comments section.		Please print legibility. If the analytical requests are not clearly defined on the chain-of-custody, the turnaround time will begin after all questions have been satisfactorily answered.	
Requested Turnaround Time (PLEASE SPECIFY)		Regulatory Classification		Special Report Format			
STANDARD <input checked="" type="checkbox"/> RUSH <input type="checkbox"/>		NPDES _____ Drinking Water _____		QA/QC Report _____			
(Lab Approval Required)		RCRA _____ MCP GW1/S1 _____		DQE (MCP) Rpt _____			
Sample Type Codes		Other _____		DEP Form(s) _____			
WW-Wastewater DW-Drinking water SW-Surface water							
LW-Lab water GW-Groundwater A-Air							
S-Solid / Soil SL-Sludge O-Oil Z-Other							
Sample ID		Date		Preservative		Radchem / Other	
		Time		None / 4°C		Oil & Grease / TOC	
		Collected		NaOH to pH > 12		Toxicity	
				HCl to pH < 2		Bacteriological	
				H2SO4 to pH < 2		General Chemistry	
				HNO3 to pH < 2		Mercury 245.1 / 7470-71	
				NaHSO4/MeOH		Metals 6010 / 200.7	
				Plastic(P) or Glass(G)		DRO / GRO / ETPH	
				# Containers		EPH / VPH	
				Comp.		PCB / Pest / Herbicide	
				Grab		Semivolatile 525 / 625 / 8270	
						Volatiles 601 / 602 / 8021	
						Volatiles 524 / 624 / 8260	
MP3 Port 19		5/4/5		2			
MP3 Port 13		1200					
MP3 Port 7		1211					
MP3 Port 5		1218					
MP3 Port 4		1223					
MP3 Port 3		1228					
MP3 Port 1		1234					
Sampled by (print): <u>Craig R. Walker</u>		Signature: <u>[Signature]</u>					
Relinquished by: <u>[Signature]</u>		Date: <u>5/4/5</u> Time: <u>1530</u>		Date: <u>5/4/5</u> Time: <u>15:30</u>		Cooler (Y) N Samples (Y) N	
Relinquished by: <u>[Signature]</u>		Date: <u>5/4/5</u> Time: <u>15:30</u>		Date: <u>5/4/5</u> Time: <u>15:30</u>		Temp @ receipt: <u>7.8</u> °C	
Relinquished by: <u>[Signature]</u>		Date: <u>5/4/5</u> Time: <u>15:30</u>		Date: <u>5/4/5</u> Time: <u>15:30</u>		Preservation / pH checked? <u>Y</u> N	
Relinquished by: <u>[Signature]</u>		Date: <u>5/4/5</u> Time: <u>15:30</u>		Date: <u>5/4/5</u> Time: <u>15:30</u>		By: <u>[Signature]</u> Date: <u>5/4/5</u>	

STL WESTFIELD

The first part of the paper discusses the importance of understanding the cultural context of the research. It highlights the need for researchers to be sensitive to the values and beliefs of the communities they are studying. This is particularly important in the field of education, where cultural differences can significantly impact learning outcomes. The paper then moves on to discuss the challenges of conducting research in diverse cultural settings. It notes that researchers often face difficulties in establishing rapport with participants and in interpreting their responses. To address these challenges, the paper suggests several strategies, including the use of local researchers and the development of culturally appropriate research instruments. The final part of the paper discusses the importance of ethical considerations in cross-cultural research. It emphasizes the need for researchers to obtain informed consent from participants and to ensure that the research is conducted in a way that respects the dignity and rights of all individuals involved.

STL Westfield  
53 Southampton Road  
Westfield, MA 01085

Tel: 413 572 4000 Fax: 413 572 3707  
www.stl-inc.com

Steve Morrow  
Olin Chemical  
1186 Lower River Road  
PO Box 248  
Charleston, TN 37310-0248

05/24/2005

Report Number: 225228

MP-4

Dear Steve Morrow,

The analysis of your sample(s) submitted on 05/05/2005 is now complete and the appropriate analytical report is enclosed. The samples were prepared and analyzed according to established methodologies and protocols. All holding times were met for the methods performed on these samples, unless otherwise noted in the report's case narrative.

If you have any questions regarding this report, please contact your Project Manager, Rebecca C. Mason.

For questions, concerns or comments regarding our service, please do not hesitate to contact me directly. Thank you for selecting STL Westfield, and we look forward to working with you on future projects.

Steven C. Hartmann  
Laboratory Director  
STL WESTFIELD

Technical Review: 5/24/05

Total number of pages in this report: 60



# MADEP MCP Analytical Method Report Certification Form

Laboratory Name: **Severn Trent Laboratory (STL) Westfield** Project #: **225228**

Project Location: **MADEP RTN<sup>1</sup>:**

This form provides certifications for the following data set:[list Laboratory Sample ID Number(s)]  
225228-1-6

Sample Matrices:	Groundwater	Soil/Sediment	Drinking Water	Other:
<b>MCP SW-846</b>	8260B ( )	8151A ( )	8330 ( )	6010B ( x ) 7470A/1A ( ) Other ( )
<b>Methods Used</b>	8270C ( )	8081A ( )	VPH ( )	6020 ( ) 9014M <sup>2</sup> ( )
As specified in MADEP Compendium of Analytical Methods: (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S <sup>3</sup> ( ) 7196A ( )
	1 List Release Tracking Number (RTN), if known 2 M - SW-846 Method 9014 or MADEP Physiologically Available Cyanide (PAC) Method 3 S - SW-846 Methods 7000 Series List individual method and analyte.			

**An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status**

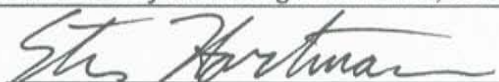
<b>A</b>	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	<input checked="" type="radio"/> Yes <input type="radio"/> No <sup>1</sup>
<b>B</b>	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	<input checked="" type="radio"/> Yes <input type="radio"/> No <sup>1</sup>
<b>C</b>	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in Section 2.0 (a), (b), (c) and (d) of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	<input checked="" type="radio"/> Yes <input type="radio"/> N/A <input type="radio"/> No <sup>1</sup>
<b>D</b>	<b>VPH and EPH methods only:</b> Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods)?	Yes <input checked="" type="radio"/> N/A <input type="radio"/> No <sup>1</sup>

**A response to questions E and F below is required for "Presumptive Certainty" status**

<b>E</b>	Were all QC performance standards and recommendations for the specified methods achieved?	<input checked="" type="radio"/> Yes <input type="radio"/> No <sup>1</sup>
<b>F</b>	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes <input type="radio"/> N/A <input checked="" type="radio"/> No <sup>1</sup>

<sup>1</sup> All Negative responses must be addressed in an attached Environmental Laboratory case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: 

Position: Laboratory Director

Printed Name: Steven C. Hartmann

Date: 5/24/05

CAM VII A, Rev 3.2

April-04



MADEP MA014  
NY DOH 10843  
RI DOH 57  
CT DPH 0494  
VT DECWSD

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NH DES 253901-A



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Fax:(978)667-7871

# MADEP MCP Analytical Method Report Certification Form

Laboratory Name: **Severn Trent Laboratory (STL) Westfield** Project #: **225228**

Project Location: **MADEP RTN<sup>1</sup>:**

This form provides certifications for the following data set:[list Laboratory Sample ID Number(s)]  
225228-1-6

Sample Matrices:	Groundwater	Soil/Sediment	Drinking Water	Other:
<b>MCP SW-846</b>	8260B ( )	8151A ( )	8330 ( )	6010B ( ) 7470A/1A ( ) Other ( x )
<b>Methods Used</b>	8270C ( )	8081A ( )	VPH ( )	6020 ( ) 9014M <sup>2</sup> ( )
As specified in MADEP Compendium of Analytical Methods. (check all that apply)	8082 ( )	8021B ( )	EPH ( )	7000 S <sup>3</sup> ( ) 7196A ( )
	1 List Release Tracking Number (RTN), if known			
	2 M - SW-846 Method 9014 or MADEP Physiologically Available Cyanide (PAC) Method			
	3 S - SW-846 Methods 7000 Series List individual method and analyte.			

**An affirmative response to questions A, B, C and D is required for "Presumptive Certainty" status**

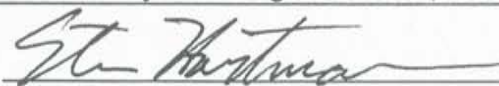
<b>A</b>	Were all samples received by the laboratory in a condition consistent with that described on the Chain-of-Custody documentation for the data set?	<input checked="" type="radio"/> Yes <input type="radio"/> No <sup>1</sup>
<b>B</b>	Were all QA/QC procedures required for the specified analytical method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate performance standards or guidelines?	<input checked="" type="radio"/> Yes <input type="radio"/> No <sup>1</sup>
<b>C</b>	Does the analytical data included in this report meet all the requirements for "Presumptive Certainty", as described in Section 2.0 (a), (b), (c) and (d) of the MADEP document CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	<input checked="" type="radio"/> Yes <input type="radio"/> N/A <input type="radio"/> No <sup>1</sup>
<b>D</b>	<b>VPH and EPH methods only:</b> Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods)?	Yes <input checked="" type="radio"/> N/A <input type="radio"/> No <sup>1</sup>

**A response to questions E and F below is required for "Presumptive Certainty" status**

<b>E</b>	Were all QC performance standards and recommendations for the specified methods achieved?	<input checked="" type="radio"/> Yes <input type="radio"/> No <sup>1</sup>
<b>F</b>	Were results for all analyte-list compounds/elements for the specified method(s) reported?	Yes <input checked="" type="radio"/> N/A <input type="radio"/> No <sup>1</sup>

<sup>1</sup> All Negative responses must be addressed in an attached Environmental Laboratory case narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: 

Position: Laboratory Director

Printed Name: Steven C. Hartmann

Date: 5/24/05

CAM VII A, Rev 3.2

April-04

**SEVERN  
TRENT** **STL**

MADEP MA014  
NY DOH 10843  
RI DOH 57  
CT DPH 0494  
VT DECWSD

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NH DES 253901-A



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## MCP CASE NARRATIVE

**Client:** Olin Chemical

**Report Number:** 225228

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues as stipulated in the MCP reporting requirements.

In order to facilitate report review, a separate MCP Analytical Method Report Certification Form is included for each method requested.

It should be noted that samples with elevated Reporting Limits (RLs) as a result of a dilution may not be able to satisfy "MCP program" reporting limits in some cases if the "adjusted" RL is greater than the applicable MCP standards or criterion to which the concentration is being compared. Such increases in the RLs are unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes, which exceed the calibration range.

Calculations are performed before rounding to avoid round-off errors in calculated results. All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

The project samples were received on 05/5/05; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt at the laboratory was 6.9°C.

### **Subcontract**

Specific Gravity was performed by STL Houston, 6310 Rothway Drive, Houston TX 77040.

### **SW846 6010B**

All QA/QC procedures required for the specified analytical method were performed as per section B of the MADEP MCP analytical method report Certification form.

All QC performance standards and recommendations for this specific method were achieved.

General method information:

Samples 225228-3-6 were diluted to bring elements within linear range.

**The following reported method is not listed in the MADEP Massachusetts Contingency Plan (MCP) Compendium of Analytical Methods (CAM), pursuant to the provisions of 310 CMR 40.0017(2).**

### **LAC 10-107061B (Ammonia)**

All QC performance standards and recommendations for this specific method were achieved.

**EPA 300.0 (Chloride)**

All QC performance standards and recommendations for this specific method were achieved.

**EPA 300.0 (Sulfate)**

All QC performance standards and recommendations for this specific method were achieved.

**LAC 10-107041A (Nitrate)**

All QC performance standards and recommendations for this specific method were achieved.

**MS18 4500NO2 B (Nitrite)**

All QC performance standards and recommendations for this specific method were achieved.

# SAMPLE INFORMATION

Date: 05/24/2005

Job Number.: 225228  
Customer...: Olin Chemical  
Attn.....: Steve Morrow

Project Number.....: 20000348  
Customer Project ID....: C033038  
Project Description....: Geomega Column Testing

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
225228-1	MP4 Port 13	Water	05/04/2005	17:08	05/05/2005	18:05
225228-2	MP4 Port 13B	Water	05/04/2005	17:10	05/05/2005	18:05
225228-3	MP4 Port 10	Water	05/04/2005	17:17	05/05/2005	18:05
225228-4	MP4 Port 3	Water	05/04/2005	17:22	05/05/2005	18:05
225228-5	MP4 Port 2	Water	05/04/2005	17:30	05/05/2005	18:05
225228-6	MP4 Port 5	Water	05/04/2005	17:40	05/05/2005	18:05



**LABORATORY TEST RESULTS**

Job Number: 225228

Date: 05/24/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP4 Port 13  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 17:08  
Sample Matrix.....: Water

Laboratory Sample ID: 225228-1  
Date Received.....: 05/05/2005  
Time Received.....: 18:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	570		20	mg/L	05/19/05	rwe
EPA300.0 PartA	Sulfate	44		20	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	0.024		0.010	mg/L	05/06/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	3.5		0.10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	1.3		0.050	mg/L	05/06/05	kmm
SW846 60108	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	49000		200	ug/L	05/17/05	rac
	Iron (Fe), Diss.	8300		50	ug/L	05/19/05	rac
	Magnesium (Mg), Diss.	8200		200	ug/L	05/17/05	rac
	Sodium (Na), Diss.	280000		2000	ug/L	05/17/05	rac
SW846 60108	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	ND	U	100	ug/L	05/17/05	rac
	Chromium (Cr), Diss.	ND	U	5.0	ug/L	05/17/05	rac

\* In Description = Dry Wgt.

Page 2



**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



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STL Billerica-Service Center  
148 Rangeway Rd.  
N. Billerica, MA 01862  
Tel: (978) 667-1400  
Fax: (978) 667-7871

**LABORATORY TEST RESULTS**

Job Number: 225228

Date: 05/24/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP4 Port 13B  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 17:10  
Sample Matrix.....: Water

Laboratory Sample ID: 225228-2  
Date Received.....: 05/05/2005  
Time Received.....: 18:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	130		100	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	41		20	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	0.016		0.010	mg/L	05/06/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	3.3		0.10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	1.5		0.050	mg/L	05/06/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	48000		200	ug/L	05/17/05	rac
	Iron (Fe), Diss.	7100		50	ug/L	05/19/05	rac
	Magnesium (Mg), Diss.	8200		200	ug/L	05/17/05	rac
	Sodium (Na), Diss.	290000		2000	ug/L	05/17/05	rac
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	ND	U	100	ug/L	05/17/05	rac
	Chromium (Cr), Diss.	ND	U	5.0	ug/L	05/17/05	rac

\* In Description = Dry Wgt.

Page 3



MADEP MA014  
RIDOH57  
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Fax: (978) 667-7871

Job Number: 225228

## LABORATORY TEST RESULTS

Date: 05/24/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP4 Port 10  
 Date Sampled.....: 05/04/2005  
 Time Sampled.....: 17:17  
 Sample Matrix.....: Water

Laboratory Sample ID: 225228-3  
 Date Received.....: 05/05/2005  
 Time Received.....: 18:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	930		100	mg/L	05/17/05	kmm
EPA300.0 PartA	Sulfate	3700		200	mg/L	05/17/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	0.079		0.010	mg/L	05/06/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	9.8		0.10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	0.12		0.050	mg/L	05/06/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	370000		2000	ug/L	05/19/05	rac
	Iron (Fe), Diss.	220000		50	ug/L	05/19/05	rac
	Magnesium (Mg), Diss.	160000		1000	ug/L	05/17/05	rac
	Sodium (Na), Diss.	1600000		10000	ug/L	05/17/05	rac
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	110000		1000	ug/L	05/19/05	rac
	Chromium (Cr), Diss.	11000		50	ug/L	05/19/05	rac

\* In Description = Dry Wgt.

Page 4



STL

MADEP MA014  
 RIDOH57  
 CTDPH 0494  
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NELAP FL E87912 TOX  
 NELAP NJ MA008 TOX  
 NELAP NY 10843  
 NY DOH 10843



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**LABORATORY TEST RESULTS**

Job Number: 225228

Date: 05/24/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP4 Port 3  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 17:22  
Sample Matrix.....: Water

Laboratory Sample ID: 225228-4  
Date Received.....: 05/05/2005  
Time Received.....: 18:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	720		100	mg/L	05/18/05	kmm
EPA300.0 PartA	Sulfate	1200		200	mg/L	05/18/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/06/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	6.8		0.10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	0.46		0.050	mg/L	05/06/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	490000		400	ug/L	05/17/05	rac
	Iron (Fe), Diss.	410000		1000	ug/L	05/19/05	rac
	Magnesium (Mg), Diss.	380000		1000	ug/L	05/17/05	rac
	Sodium (Na), Diss.	1600000		10000	ug/L	05/17/05	rac
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	ND	U	200	ug/L	05/17/05	rac
	Chromium (Cr), Diss.	16		10	ug/L	05/17/05	rac

\* In Description = Dry Wgt.

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**STL**

MADEP MA014  
RIDOH57  
CTDPH 0494  
VT DECWSD  
NH DES 253903-A

NELAP FL E87912 TOX  
NELAP NJ MA008 TOX  
NELAP NY 10843  
NY DOH 10843



STL Westfield  
53 Southampton Rd.  
Westfield, MA 01085  
Tel: (413) 572-4000  
Fax: (413) 572-3707

STL Billerica-Service Center  
148 Rangeway Rd.  
N. Billerica, MA 01862  
Tel: (978) 667-1400  
Fax: (978) 667-7871



Job Number: 225228

## LABORATORY TEST RESULTS

Date: 05/24/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP4 Port 2  
 Date Sampled.....: 05/04/2005  
 Time Sampled.....: 17:30  
 Sample Matrix.....: Water

Laboratory Sample ID: 225228-5  
 Date Received.....: 05/05/2005  
 Time Received.....: 18:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	1500		100	mg/L	05/18/05	kmm
EPA300.0 PartA	Sulfate	2500		200	mg/L	05/18/05	kmm
SM18 4500NO2 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/06/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	5.1		0.10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	0.33		0.050	mg/L	05/06/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	480000		400	ug/L	05/17/05	rac
	Iron (Fe), Diss.	320000		1000	ug/L	05/19/05	rac
	Magnesium (Mg), Diss.	380000		1000	ug/L	05/17/05	rac
	Sodium (Na), Diss.	1500000		10000	ug/L	05/17/05	rac
SW846 6010B	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	ND	U	200	ug/L	05/17/05	rac
	Chromium (Cr), Diss.	16		10	ug/L	05/17/05	rac

\* In Description = Dry Wgt.

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STL

MADEP MA014  
 RIDOH57  
 CTDPH 0494  
 VT DECWSD  
 NH DES 253903-A

NELAP FL E87912 TOX  
 NELAP NJ MA008 TOX  
 NELAP NY 10843  
 NY DOH 10843



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 Fax: (978) 667-7871



Job Number: 225228

## LABORATORY TEST RESULTS

Date: 05/24/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Customer Sample ID: MP4 Port 5  
 Date Sampled.....: 05/04/2005  
 Time Sampled.....: 17:40  
 Sample Matrix.....: Water

Laboratory Sample ID: 225228-6  
 Date Received.....: 05/05/2005  
 Time Received.....: 18:05

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	REPORTING LIMIT	UNITS	DATE	TECH
EPA300.0 PartA	Chloride	1300		100	mg/L	05/18/05	kmm
EPA300.0 PartA	Sulfate	4100		200	mg/L	05/18/05	kmm
SM18 4500N02 B	Nitrite as N (NO2-N)	ND	U	0.010	mg/L	05/06/05	kmm
LAC 10-107061B	Ammonia (NH3), as N	15		0.10	mg/L	05/06/05	kmm
LAC 10-107041A	Nitrate as N (NO3-N)	0.41		0.050	mg/L	05/06/05	kmm
SW846 6010B	Metals Analysis (ICP)						
	Calcium (Ca), Diss.	470000		4000	ug/L	05/19/05	rac
	Iron (Fe), Diss.	2400000		5000	ug/L	05/19/05	rac
	Magnesium (Mg), Diss.	610000		4000	ug/L	05/19/05	rac
SW846 6010B	Sodium (Na), Diss.	4600000		200000	ug/L	05/19/05	rac
	Metals Analysis (ICP)						
	Aluminum (Al), Diss.	26000		2000	ug/L	05/19/05	rac
	Chromium (Cr), Diss.	5200		100	ug/L	05/19/05	rac

\* In Description = Dry Wgt.

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MADEP MA014  
 DOH57  
 CTDPH 0494  
 VT DECWSD  
 NH DES 253903-A

NELAP FL E87912 TOX  
 NELAP NJ MA008 TOX  
 NELAP NY 10843  
 NY DOH 10843



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 Fax: (978) 667-7871

## LABORATORY CHRONICLE

Job Number: 225228

Date: 05/24/2005

CUSTOMER: Olin Chemical

PROJECT: C03303B

ATTN: Steve Morrow

Lab ID: 225228-1	Client ID: MP4 Port 13	Date Recvd: 05/05/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED DILUTION
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44183			05/17/2005 0000 10
EPA300.0 PartA	Ion Chromatography Analysis	1	44390			05/19/2005 0000 20
SW846 6010B	Metals Analysis (ICP)	1	44127			05/17/2005 1201
SW846 6010B	Metals Analysis (ICP)	1	44195			05/17/2005 1201
SW846 6010B	Metals Analysis (ICP)	1	44095			05/17/2005 2104
SW846 6010B	Metals Analysis (ICP)	1	44235			05/19/2005 1236
LAC 10-107041A	Nitrate Nitrogen as N	1	43596			05/06/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43593			05/06/2005 1720
Lab ID: 225228-2	Client ID: MP4 Port 13B	Date Recvd: 05/05/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED DILUTION
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44183			05/17/2005 0000 10
EPA300.0 PartA	Ion Chromatography Analysis	1	44183			05/17/2005 0000 100
SW846 6010B	Metals Analysis (ICP)	1	44127			05/17/2005 1218
SW846 6010B	Metals Analysis (ICP)	1	44195			05/17/2005 1218
SW846 6010B	Metals Analysis (ICP)	1	44095			05/17/2005 2117
SW846 6010B	Metals Analysis (ICP)	1	44235			05/19/2005 1239
LAC 10-107041A	Nitrate Nitrogen as N	1	43596			05/06/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43593			05/06/2005 1720
Lab ID: 225228-3	Client ID: MP4 Port 10	Date Recvd: 05/05/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED DILUTION
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44183			05/17/2005 0000 100
SW846 6010B	Metals Analysis (ICP)	1	44095			05/17/2005 2120 5
SW846 6010B	Metals Analysis (ICP)	1	44194			05/19/2005 1213 10
SW846 6010B	Metals Analysis (ICP)	1	44196			05/19/2005 1213 10
SW846 6010B	Metals Analysis (ICP)	1	44235			05/19/2005 1243
LAC 10-107041A	Nitrate Nitrogen as N	1	43596			05/06/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43593			05/06/2005 1720
Lab ID: 225228-4	Client ID: MP4 Port 3	Date Recvd: 05/05/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED DILUTION
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44184			05/18/2005 0000 100
SW846 6010B	Metals Analysis (ICP)	1	44127			05/17/2005 1230 2
SW846 6010B	Metals Analysis (ICP)	1	44195			05/17/2005 1230 2
SW846 6010B	Metals Analysis (ICP)	1	44095			05/17/2005 2123 5
SW846 6010B	Metals Analysis (ICP)	1	44235			05/19/2005 1335 20
LAC 10-107041A	Nitrate Nitrogen as N	1	43596			05/06/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43593			05/06/2005 1720
Lab ID: 225228-5	Client ID: MP4 Port 2	Date Recvd: 05/05/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED DILUTION
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000
EPA300.0 PartA	Ion Chromatography Analysis	1	44184			05/18/2005 0000 100
SW846 6010B	Metals Analysis (ICP)	1	44127			05/17/2005 1236 2
SW846 6010B	Metals Analysis (ICP)	1	44195			05/17/2005 1236 2
SW846 6010B	Metals Analysis (ICP)	1	44095			05/17/2005 2127 5
SW846 6010B	Metals Analysis (ICP)	1	44235			05/19/2005 1338 20
LAC 10-107041A	Nitrate Nitrogen as N	1	43596			05/06/2005 0000
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43593			05/06/2005 1720
Lab ID: 225228-6	Client ID: MP4 Port 5	Date Recvd: 05/05/2005	Sample Date: 05/04/2005			
METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED DILUTION
LAC 10-107061B	Ammonia	1	43585			05/06/2005 0000

Job Number: 225228

## LABORATORY CHRONICLE

Date: 05/24/2005

CUSTOMER: Olin Chemical

PROJECT: C033038

ATTN: Steve Morrow

Lab ID: 225228-6 Client ID: MP4 Port 5

Date Recvd: 05/05/2005 Sample Date: 05/04/2005

METHOD	DESCRIPTION	RUN#	BATCH#	PREP BT	#(S)	DATE/TIME ANALYZED	DILUTION
EPA300.0 PartA	Ion Chromatography Analysis	1	44184			05/18/2005 0000	100
SW846 6010B	Metals Analysis (ICP)	1	44194			05/19/2005 1218	20
SW846 6010B	Metals Analysis (ICP)	1	44196			05/19/2005 1218	20
SW846 6010B	Metals Analysis (ICP)	1	44235			05/19/2005 1341	100
LAC 10-107041A	Nitrate Nitrogen as N	1	43596			05/06/2005 0000	
SM18 4500NO2 B	Nitrite, Colormetric Method	1	43593			05/06/2005 1720	

# **SUBCONTRACTED DATA**



## ANALYTICAL REPORT

JOB NUMBER: 295333  
Project ID: SPECIFIC GRAVITY

Prepared For:

STL Westfield  
53 Southampton Road  
Westfield, MA 01085

Attention: Rebecca Mason

Date: 05/18/2005

Signature

Name: Sean V. Sundquist

Title: Project Manager III

E-Mail: ssundquist@stl-inc.com

Date

Severn Trent Laboratories  
6310 Rothway Drive  
Houston, TX 77040

PHONE: 713-690-4444

TOTAL NO. OF PAGES

17



SEVERN

TRENT

STL

05/18/2005

Rebecca Mason  
STL Westfield  
53 Southampton Road  
Westfield, MA 01085

Reference:

Project : Specific Gravity  
Project No. : 295333  
Date Received : 05/10/2005  
STL Job : 295333

Dear Rebecca Mason:

Enclosed are the analytical results for your project referenced above. The following samples are included in the report.

1. MP4 PORT 13
2. MP4 PORT 13B
3. MP4 PORT 10
4. MP4 PORT 3
5. MP4 PORT 2
6. MP4 PORT 5

All holding times were met for the tests performed on these samples.

Enclosed, please find the Quality Control Summary. All quality control results for the QC batch that are applicable to the sample(s) are acceptable except as noted in the QC batch reports.

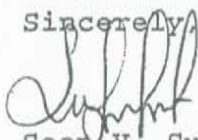
The test results in this report meet all NELAP requirements for STL Houston's NELAP accredited parameters. Any exceptions to NELAP requirements will be noted and included in a case narrative as a part of this report.

If the report is acceptable, please approve the enclosed invoice and forward it for payment.

Thank you for selecting Severn-Trent Laboratories to serve as your analytical laboratory on this project. If you have any questions concerning these results, please feel free to contact me at any time.

We look forward to working with you on future projects.

Sincerely,



Sean V. Sundquist  
Project Manager

SAMPLE INFORMATION  
Date: 05/18/2005Job Number.: 295333  
Customer...: STL Westfield  
Attn.....: Rebecca MasonProject Number.....: 99005907  
Customer Project ID....: SPECIFIC GRAVITY  
Project Description....: Specific Gravity

Laboratory Sample ID	Customer Sample ID	Sample Matrix	Date Sampled	Time Sampled	Date Received	Time Received
295333-1	MP4 PORT 13	Water	05/04/2005	17:08	05/10/2005	08:39
295333-2	MP4 PORT 13B	Water	05/04/2005	17:10	05/10/2005	08:39
295333-3	MP4 PORT 10	Water	05/04/2005	17:17	05/10/2005	08:39
295333-4	MP4 PORT 3	Water	05/04/2005	17:22	05/10/2005	08:39
295333-5	MP4 PORT 2	Water	05/04/2005	17:30	05/10/2005	08:39
295333-6	MP4 PORT 5	Water	05/04/2005	17:40	05/10/2005	08:39

## LABORATORY TEST RESULTS

Job Number: 295333

Date: 05/18/2005

CUSTOMER: STL Westfield

PROJECT: SPECIFIC GRAVITY

ATTN: Rebecca Mason

Customer Sample ID: MP4 PORT 13  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 17:08  
Sample Matrix.....: Water

Laboratory Sample ID: 295333-1  
Date Received.....: 05/10/2005  
Time Received.....: 08:39

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/18/05	daw

## LABORATORY TEST RESULTS

Job Number: 295333

Date: 05/18/2005

CUSTOMER: STL Westfield

PROJECT: SPECIFIC GRAVITY

ATTN: Rebecca Mason

Customer Sample ID: MP4 PORT 13B  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 17:10  
Sample Matrix.....: Water

Laboratory Sample ID: 295333-2  
Date Received.....: 05/10/2005  
Time Received.....: 08:39

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00		0.01	g/mL	05/18/05	daw

Job Number: 295333

## LABORATORY TEST RESULTS

Date: 05/18/2005

CUSTOMER: STL Westfield

PROJECT: SPECIFIC GRAVITY

ATTN: Rebecca Mason

Customer Sample ID: MP4 PORT 10  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 17:17  
Sample Matrix.....: Water

Laboratory Sample ID: 295333-3  
Date Received.....: 05/10/2005  
Time Received.....: 08:39

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.01		0.01	g/mL	05/18/05	daw



LABORATORY TEST RESULTS		Job Number: 295333		Date: 05/18/2005			
CUSTOMER: STL Westfield		PROJECT: SPECIFIC GRAVITY		ATTN: Rebecca Mason			
Customer Sample ID: MP4 PORT 3 Date Sampled.....: 05/04/2005 Time Sampled.....: 17:22 Sample Matrix.....: Water		Laboratory Sample ID: 295333-4 Date Received.....: 05/10/2005 Time Received.....: 08:39					
TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.01		0.01	g/mL	05/18/05	daw

LABORATORY TEST RESULTS		Date: 05/18/2005	
Job Number: 295333			
CUSTOMER: STL Westfield		PROJECT: SPECIFIC GRAVITY	
		ATTN: Rebecca Mason	
Customer Sample ID: MP4 PORT 2 Date Sampled.....: 05/04/2005 Time Sampled.....: 17:30 Sample Matrix.....: Water		Laboratory Sample ID: 295333-5 Date Received.....: 05/10/2005 Time Received.....: 08:39	
TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.00	daw

Job Number: 295333

## LABORATORY TEST RESULTS

Date: 05/18/2005

CUSTOMER: STL Westfield

PROJECT: SPECIFIC GRAVITY

ATTN: Rebecca Mason

Customer Sample ID: MP4 PORT 5  
Date Sampled.....: 05/04/2005  
Time Sampled.....: 17:40  
Sample Matrix.....: Water

Laboratory Sample ID: 295333-6  
Date Received.....: 05/10/2005  
Time Received.....: 08:39

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	FLAGS	REPORTING LIMIT	UNITS	DATE	TECH
ASTM D70	Specific Gravity Specific Gravity, Liquid	1.02		0.01	g/mL	05/18/05	daw

LABORATORY CHRONICLE			
Job Number: 295333		Date: 05/18/2005	
CUSTOMER: STL Westfield		PROJECT: SPECIFIC GRAVITY	
		ATTN: Rebecca Mason	
Lab ID: 295333-1	Client ID: MP4 PORT 13	Date Recvd: 05/10/2005	Sample Date: 05/04/2005
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED DILUTION
ASTM D70	Specific Gravity	1 129475	05/18/2005 0830
Lab ID: 295333-2	Client ID: MP4 PORT 13B	Date Recvd: 05/10/2005	Sample Date: 05/04/2005
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED DILUTION
ASTM D70	Specific Gravity	1 129475	05/18/2005 0830
Lab ID: 295333-3	Client ID: MP4 PORT 10	Date Recvd: 05/10/2005	Sample Date: 05/04/2005
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED DILUTION
ASTM D70	Specific Gravity	1 129475	05/18/2005 0830
Lab ID: 295333-4	Client ID: MP4 PORT 3	Date Recvd: 05/10/2005	Sample Date: 05/04/2005
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED DILUTION
ASTM D70	Specific Gravity	1 129475	05/18/2005 0830
Lab ID: 295333-5	Client ID: MP4 PORT 2	Date Recvd: 05/10/2005	Sample Date: 05/04/2005
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED DILUTION
ASTM D70	Specific Gravity	1 129475	05/18/2005 0830
Lab ID: 295333-6	Client ID: MP4 PORT 5	Date Recvd: 05/10/2005	Sample Date: 05/04/2005
METHOD	DESCRIPTION	RUN# BATCH# PREP BT #(S)	DATE/TIME ANALYZED DILUTION
ASTM D70	Specific Gravity	1 129475	05/18/2005 0830



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White = Lab file    Yellow = Report copy    Pink = Customer copy